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Technical Report Series

The Nipigon River: A Retrospective Summary of Information about the Fish Community.

NIPIGON BAY



NORTH SHORE
OF LAKE SUPERIOR
REMEDIAL ACTION PLANS



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THE NIPIGON RIVER:

**A RETROSPECTIVE SUMMARY OF INFORMATION
ABOUT THE FISH COMMUNITY**

A Report to:

**Ontario Ministry of Natural Resources
Nipigon District
Division of Fish and Wildlife**

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INTRODUCTION

Since the 1970s ideas about and practices of fisheries management and environmental protection have changed, and in some areas, begun to converge. Initially this was because of a growing awareness of the extent to which the two are interrelated. The well-being of an individual population or stock is influenced not only by other species in the biological community, but also by abiotic factors: the environmental conditions to which it is exposed, and the habitat available to it. Conversely, the condition of the environment often is indicated by the biological communities, or individual species, that it can support. These interrelationships have been recognized by the Great Lakes Water Quality Board (IJC/WQB 1985) in its initiatives to rehabilitate degraded environments (called Areas of Concern or AOCs) within the Great Lakes. Another perspective that has implications for resource management, discussed by Steedman and Regier (1987) and others, suggests that historical and other characterizations of ecosystems are prerequisites of more detailed analyses. Efforts to rehabilitate an environment are thought to be most effective when "key structural and functional aspects of aquatic ecosystems"(Ibid.) are recognized.

Fisheries management in Ontario in the 1980s also has focused on the development of increasingly specific management plans, first at the regional level (OMNR 1982), and currently for the fisheries in individual districts (e.g. OMNR 1989). Elements of such plans are the identification of issues, or problems; and of the benefits that the local citizens hope to accrue from the various fisheries; and setting the priorities for future management efforts.

The mouth of the Nipigon River is part of the AOC that has been identified in Nipigon Bay (IJC/WQB Ibid.). The rehabilitation of fish populations of the bay, especially walleye, has been identified as a fisheries management priority (OMNR Ibid.); the major spawning area for this stock was upstream from the mouth (Ryder 1957, 1968). This is just one example of the extent of overlap between fish stocks in the bay and in the lower river. Another major issue in the lower river is the decline of the brook trout. The decline of that species on the Nipigon River and in Lake Nipigon is recognized as the primary fisheries concern in Nipigon district (OMNR Ibid.). A compilation of all the existing information about the river and its fish communities and related fisheries was undertaken in order to document the data base and to provide focus for both environmental rehabilitation and fisheries management efforts.

The objective of this project is:

- to compile (in supplementary reports) existing information pertinent to the fish community of the Nipigon River; and their associated fisheries; and
- to extract and summarize (in this document) the information that is of potential relevance to the management of the river and its aquatic community.

This summary has focused on the following: reconstruction of the major environmental changes that have taken place on the river as well as changes in its aquatic community, and the identification, where possible, of cause- and- effect links between the two.

METHODS

The information base was determined by the following report guidelines:

"The report will address physical and chemical changes in the Nipigon River and connected water bodies which have a direct or perceived effect on the resident and migrant fisheries community of the river. Shifts in the fisheries community structure from historic times through 1988 will be documented. Socioeconomic impacts on the Nipigon River system fisheries community will be addressed." (OMNR 1988).

Potential effects on aquatic biota other than fishes also have been considered, and relevant information has been included where such information exists. By expanding the focus in this way I hoped to retrieve any information that might be useful in the broader context of the rehabilitation of the aquatic environment and related biological communities.

Three types of information have been included, each requiring a different approach. I gleaned any relevant information from historical references, such as published diaries, that were obtained from a variety of sources, including the Nipigon Museum and a literature search of the accessions at Lakehead University, Thunder Bay. Copies of the references that were useful are collected in Supplemental Report No. 1 of this document.

I reviewed all the information available from official sources such as the Ontario Ministries of the Environment (OMOE) and Natural Resources (OMNR), Ontario Hydro and the Sea Lamprey Control Center. Copies of pertinent historical material from the agencies that preceded OMNR are collected in Supplemental Report No. 2; relevant material from

Ontario Hydro is collected in Supplemental Report No. 3. All three supplemental reports have been filed with OMNR, Nipigon District. The published information from the Sea Lamprey Control Centre is contained in their annual reports (from 1980 to 1985, no report in 1982) and in the annual reports of the Great Lakes Fisheries Commission (for 1956-1965) and the minutes of the annual meeting of the Lake Superior Committee (1966, and 1972 to 1984). No information directly relevant to the Nipigon system was found in a search of reports of the Freshwater Institute in Winnipeg.

The third major source of information was the observations and intuitions of people who have lived and fished on the river. An informal process was used to conduct these interviews. After having read the historical and agency information, and having determined what the major events and potential questions seemed to be, I contacted individuals made known to me by the OMNR district staff and others. I telephoned, then wrote each, identifying what specific information I hoped they could provide, and soliciting other comments (*see* Appendix 1 for an example). I then spoke with each individual in person. New questions often were asked as the result of information from other interviewees. From the wealth of information provided I reconstructed the picture that is presented in the report. While I tried to resolve any apparent contradictions in factual information among the comments of individuals by asking additional questions, I did not exclude relevant opinions that might conflict with conventional explanations of events. My objective was to record opinions that reflected the experience and perceptions of the individuals. I circulated the appropriate sections of a draft report to major contributors for their comments. A complete list of the people to whom I refer is given in the acknowledgements.

DESCRIPTION

Location

The Nipigon River empties into Nipigon Bay, on the north shore of Lake Superior, at the town of Nipigon, 100 kilometers north of Thunder Bay.

The area is covered predominantly by boreal forest, much of which has been logged over at some point in time. Development along the river consists of three hydro developments, an Indian reserve on Lake Helen, and the town of Nipigon at its mouth. A pulp and paper mill dominates the bay. Because of environmental degradation caused by effluent from the mill, the bay has been identified as an Area Of Concern by the International Joint Commission (IJC/WQB 1985).

The Nipigon River System

The Nipigon River (Fig. 1) flows south for about 51 kilometers (32 miles) from Lake Nipigon to Lake Superior, through a gorge that follows a geological fault (Near 1982). Along its course it drops 75 meters (250 feet) in elevation, cutting through ancient (precambrian) red sandstones, with their flat caps of volcanic diabase, in its precipitous descent. The resulting cliffs tower over stretches of the river as it cascades over concrete sills and glacial deposits of gravel. At one time falls and rapids punctuated 16 kilometers (10 miles) of its route. The river is now characterized by lakes that alternate with turbulent stretches. The largest of the lakes, Lake Helen, differs in that it is not formed by a dam. The river flows through only the southern corner of the lake, which extends northward as a cul-de-sac.

Not only is the river impressive in itself; it drains Lake Nipigon, with its large tertiary watershed: 38,129 square kilometers of land and water surface areas, including the Ogoki diversion (Shraeder 1983). The glacial history and unique character of the Nipigon basin, the northern headwaters of the Great Lakes, are eloquently described by Waters (1987) in his recent book about Lake Superior. The flora and fauna of the basin and of the lake itself were studied during the 1920s by scientists from the University of Toronto. Their publications are listed in Dymond et al. (1928). More recently, the Lake Nipigon Fisheries Assessment Unit has been involved in fisheries work on the lake. As noted in its reports (e.g. Shraeder Ibid.) the major activities on the lake are a long-standing commercial fishery of whitefish, walleye, and lake trout; and tourist outfitters who rely heavily on brook trout. The primary sport fisheries concern is the declining brook trout stocks.

The Nipigon River is also the largest (in terms of discharge) tributary of Lake Superior (Waters Ibid.). Along with the lake's other major tributaries, the shallow nearshore areas, which in this case are in Nipigon Bay, and the mouth of the river play important roles in the ecosystem of the lake. They are relatively productive, support a different complex of species than the deeper, colder waters of the open lake, and provide important sources of nutrients, and essential nursery and spawning habitat for a range of species. Industrial development and settlements currently are concentrated near the mouth of the river and on the bay.

INFORMATION SUMMARIES

The Fish Assemblages

The original fish assemblage

The rivers that flow into Lake Superior have been noted for their abundant fishing for as far back as we can trace. This abundance is more properly attributed to seasonal concentrations of spawning or migrating fish than to the intrinsic productivity of the waters (Waters 1987). The number of species that made up the early (pre 1900) fish communities of the Nipigon River would have been relatively small, and they would have been determined by two factors: post-glacial colonization and habitat suitability. Descriptions from the late 1800s focus on brook trout, and their favorite food, the cockatouch (slimy sculpin); they also refer to lake trout, (lake) whitefish, and (northern) pike in all the major sections of the river (Hewitt 1948, Whicher 1888). By 1902 walleye and suckers (common white and longnose?), in addition to northern pike were being removed as a nuisance. (Anon. 1902). Walleye were not mentioned in early diaries, but are referred to in the final report of the Game and Fisheries Commission (Anon. 1912a) as occurring in suitable habitat throughout the watershed. Other species are known to have occurred in the system below Alexander Falls. These included burbot and (lake) sturgeon, which were common in Steamboat Bay until the 1920s (Wawia pers. comm.), and tullibee (lake herring) and "blue pickerel" (sauger) (Smutylo pers. comm.).¹

Introductions and invaders

By the early twentieth century the array of species found in the lower river started to change as a result of human activities.

Seven species have been added to the fish community as the result of intentional or accidental introductions, or invasion : smallmouth bass (common early in the century in Lake Helen (Wawia pers. comm.)), carp (present in small numbers in the lower river since before the 1950s (Smutylo Ibid.)), rainbow trout, pink and chinook salmon, rainbow smelt, and sea lamprey (which gained entry to the upper Great Lakes as a result of the building of the Welland Canal). Coho salmon and brown trout also are caught very occasionally. Details about these introductions, and other attempts to introduce new species are given in Appendix 2.

Species that have been lost or severely reduced include the lake sturgeon, smallmouth bass, sauger, and walleye. Since the 1960s yellow perch have become common in the bay, and

¹I have retained the name used by the source, adding (in brackets) the common name used by Scott and Crossman (1973). Latin names for the species that have been confirmed still to occur in the river are listed in Table 1.

subsequently on the river. Ryder (*see* Appendix 6) notes that they were not present on the walleye spawning grounds in the late 1950s but were observed there in the 1960s, by which time water quality in that area had deteriorated (*Ibid*).

In 1987 twenty five species were collected at the mouth of the river in late July by electrofishing (Dalziel 1988), a technique designed to catch as wide a range of species as possible. Since only 19 of those species were collected in 1986 (Hamilton 1987), Dalziel (*Ibid*.) infers that more sampling may be necessary "to adequately characterize this fish community."

Other species have been collected at other times of year and/ or using other gear (*see* p. 23). Combining information from all these sources, Table 1 lists 31 species that are known currently to occur in the lower Nipigon River.

Barriers and patterns of fish movement along the river

Fewer species live in upstream sections where immigration has been blocked by hydro dams, and, perhaps, by natural barriers. From the perspective of the fish community the river probably always has consisted of a series of more or less (depending on how strong a swimmer a species is) discrete sections. Any attempt to describe exactly what the sections are (or were), or how complete their isolation is (or was) is hampered by a lack of information, but a partial picture emerges from the following details.

The movement of fish upstream from Lake Superior is blocked by the dam at Alexander Falls, built in 1930. This barrier limits annual migrations and prevents the natural expansion of the range of introduced or invading species such as salmon and sea lamprey. The original dam included a fish ladder that met government requirements (Hogg 1931). No subsequent reference to the fishway, or evidence of its existence or effectiveness has been found. A similar fish ladder at the Cameron Falls dam, built in 1920, was judged to be ineffective and was eliminated in 1958 (Near 1982). It is not known whether Cameron Falls was an impassable barrier before the dam was built. Historical clues are contradictory. Although an early book expresses the opinion that fish could not have made it over the ledge (Millard 1917), the fish ladders were installed to ensure that fish might have free passage between Lake Superior and Lake Nipigon (Hogg *Ibid*.). Rainbow trout were reported to have been caught in the river upstream of the falls before 1924 (MacBeath 1924) and again in the 1953 (Douglas pers. comm.). In 1904 a 25 pound rainbow trout

was caught in Lake Nipigon (Anon., 1905) ; the only reported prior stocking of the species had been in Lake Superior (*see* Appendix 2).

Before 1950 the river above Cameron Falls probably was navigable by strong swimmers like trout all the way to Lake Nipigon. Local residents (Townes pers. comm.) recall seeing fish move between Hannah Lake and Lake Nipigon at "the overflow". Several sources also refer to fish moving from the lake into the river below Virgin Falls to spawn (Millard *Ibid.*, Anon., 1901). It seems reasonable to assume that the early trout stocks along the upper river overlapped (to an unknown extent) with those of adjacent waters of Lake Nipigon. This movement between lake and river was impeded during the years (1926-1950) when the Virgin Falls dam was intact. The hydro dam, built downstream at Pine Portage in 1950, now acts as a complete barrier to migration along the upper river.

Movement of fish between the lower river and Nipigon Bay continues to be a major influence on the composition of the fish assemblages of both. Some stocks of species such as lake whitefish, lake trout and walleye may live exclusively in suitable portions of the river system, while others may range over large areas of the river and bay, with adults concentrating seasonally in migratory runs up the river. For other migratory species such as rainbow trout, the Pacific salmon, rainbow smelt and sea lamprey the life cycles involves a more rigid pattern of presence and absence from the river. In these species, the young emerge from eggs laid in riverine spawning beds, they spend certain juvenile stages in the river, then disperse to the open waters of Lake Superior, to return as mature fish in seasonal spawning runs.

In the above, we can see that life cycles and barriers to movement both influence whether or not a particular species is found in a particular section of river at any given season. Any description of fish assemblages is made even more complex by changes that have taken place through time in the relative abundance of the different species. Information exists on only the major species. This is summarized below.

Brook trout

From the human perspective, by far the most notable species in the river was the brook trout. Because of the unusually large size of these fish and the long stretches of river in which they concentrated, and because of the existence of reliable outfitters (initially, the Hudson Bay Company), the Nipigon River had become a well-known brook trout fishery by the late 1800s. The anglers were mainly Americans (Flanagan 1881, cited by Lein

1973). They variously reported that the average brook trout caught in a given season was two pounds (Roland 1876 cited by Lein 1972); and that afternoon catches totalled 64, 56, and 55 & 1/2 pounds of brook trout (13 fish, yielding an average of 4.3 pounds) (Vail 1883 cited by Lein 1973). The reputation of the fishery was further enhanced when the new railway (the Canadian Pacific Railway (CPR)) began to promote travel to the area.(i.e. Whicher 1884). Its name as a world class fishery was sealed with the capture in 1915 of the largest brook trout ever recorded, a 6.6 kg.(14 lb., 8 oz.) fish.(Scott and Crossman 1973). Even as its fame spread, there were some who bemoaned the easy access and reduced catches. As early as 1888 a Mr. Macdonough wrote:

"It is no longer possible, as it was twenty-five years ago, to take in a day a barrel of trout averaging four pounds, nor can the angler now quickly fill his basket within sight of the Red Rock Landing. But that the fish were there, from this record of one rod for two hours each day merely to supply the wants of three men:

1886 eleven pounds of fish averaging 2 lbs. 2 oz.

1887 eleven pounds of fish averaging 2 lbs.

1888 ten pounds of fish averaging 2 lbs. 4 oz." (quoted by Lein 1974)

All things are relative, and ardent brook trout fishermen continued to exclaim over fishing on the Nipigon through the 1920s, 30s, and 40s (Mills 1985). From early accounts (Millard 1917; Mills Ibid., Whicher 1888) we learn that the best fishing was found at Pine Portage, where 4 to 5 pound trout were "not uncommon" (Millard Ibid.), and pools above and below Virgin Falls, with other "world class" water between the two (Ibid.). The winners of the Nipigon Trophy, given by the Canadian National Railway (CNR) for the largest brook trout caught by tourists in "Nipigon waters", usually were caught above Virgin Falls (Dymond 1926). Winning fish in 1918 through 1924 weighed 6 1/2 lb, 6 1/4 lb., 7 1/2 lb., 7 lb., 7 lb. 9 oz., 7 1/2 lb, and 7 lb. 9 oz., respectively. Fishing below Alexander Falls received mixed reviews. The Overseer, William McKirdy, said there was "no reliable fishing" (Anon. 1901) along that stretch and it was considered "poor" by Mills (Ibid.) in 1934-37.

With the construction of the dam at Pine Portage in 1950 most of the prime brook trout habitat was flooded out, and the popular locations for brook trout fishing moved. Fishing concentrated at Virgin Falls, below Pine Portage to Jessie Lake, below Cameron Falls, and along the lower river. Long-time anglers (Dupuis pers. comm., Smutylo pers. comm.) report that by the mid-seventies brook trout numbers were declining noticeably, and there has been an increase in their size (Dupuis Ibid.). The large size also is indicated by the fact

that in 1985 through 1987 twenty-one brook trout from the Nipigon River were among the annual top 15 fish in the OFAH- Molson Big Fish Contest, live release category (see Appendix 3 and 4 for complete listings). Within the past three to four years the decline in numbers has been dramatic. Creel surveys done in 1987 and 1988 confirm the decline of the brook trout, showing very low catch-per effort results of 0.03 and 0.05 fish-caught-per-hour, respectively (Table 2).

Lake Whitefish

Although the Nipigon became famous for its brook trout, other species also have been important. Before the development of the sports fishery lake whitefish may have rivalled brook trout in prominence. Early reports refer to whitefish¹ in the lower river in such numbers as to "crowd out" the trout (Whicher 1888). They also were found below Virgin Falls "in season" (Millard 1917) and year-round (Anon 1901). At that time native people still stocked up on fall runs of trout and whitefish for their winter food supply.(Anon. 1906; Hewitt 1948; Wawia pers. comm.). Lake whitefish from Lake Helen were also an important source of food until their recent decline (Ibid.). A decline in abundance was noticed in the late 1960s by some (Dupuis Ibid.) and again in the past five to 10 years by others (Smutylo pers. comm., Zygmunt pers. comm.). Dupuis (Ibid.) notes that numbers may have stabilized on the river, but sees little evidence of any improvement, despite the recovery of lake whitefish stocks in the bay. Although few anglers actively fish for lake whitefish, they currently are one of the most commonly harvested fish in the creel (Table 2).

To adequately describe the lake whitefish stocks in the river one must include what has happened to populations in Nipigon Bay and Lake Nipigon. These populations have been fished commercially since the 1800s and 1917, respectively (Goodier 1981, Anon 1919). (A small harvest was reported from Lake Nipigon earlier, in 1914 (Ibid 1915.) Although the extent of overlap between lake whitefish in the river system and in Nipigon Bay has never been determined, the situation on Nipigon Bay undoubtedly affected the species in Lake Helen, and at least the lower river. This has been summarized in Vander Wal et al.

¹ References to whitefish may include more than one species of fish; they undoubtedly include the lake whitefish, *Coregonus clupeaformis*, but may also include round whitefish, *Prosopium cylindraceum*, and, less commonly, lake herring (*C. artedii*). Round whitefish are most commonly called menominee.

(1989). Briefly, commercial fisheries operated on the bay from the nineteenth century (5500 fish in 1837, (Goodier 1981)) until 1985, when it became opportune for OMNR to buy out the fishermen. During the fisheries' existence the main disruption was the collapse that occurred in the 1950s as a result of overfishing and sea lamprey predation (Lawrie and Rahrer 1972). By the 1980s the lake whitefish numbers in Nipigon Bay seem to have recovered (MacCallum and Selgeby 1987).

Lake trout

Closely linked with the history of the lake whitefish is that of the lake trout. Hewitt (1948) refers to the movement of large trout into the river late in the season (in 1887 or 1891) from both Lakes Nipigon and Superior. He also distinguishes between the "squaretails", or brook trout, and the "almost bluish" lake trout; he determined that one weighing six pounds was six and a half years old. It seems likely that there was a spawning run of Lake Superior lake trout in the Nipigon River, as well as resident populations in Lake Helen, Lake Jessie and below Virgin Falls. Those fishing for brook trout occasionally caught the larger lake trout; Whicher (1888) refers to 10 to 20 pound lake trout being caught below Virgin Falls. Upstream, in Lake Nipigon a significant commercial fishery for lake trout did not start until 1917, when railway access was established. In Nipigon Bay the commercial harvest had begun earlier. Goodier (1981) quotes Red Rock Post records as showing that "two kegs" of trout (either lake trout or brook trout) were reported in 1837. The fate of the lake trout during this century has dominated fisheries studies on Lake Superior and is the subject of numerous reports, including those by Goodier (.Ibid.), Lawrie and Rahrer (1972), and MacCallum and Selgeby (1987). The decline seen in the 1950s seems finally to have been reversed, with fall runs of lake trout being noticed in the river over the past five years (Smutylo pers. comm., Zygmunt pers. comm.). The run in 1988, consisting of stocked fish from 1 1/2 to two pounds, was the largest to date. .

Walleye

The early history of walleye stocks is unclear; they either were unnoticed by early anglers, or not considered worth mentioning. Some were removed as coarse fish in the early 1900s (see p.21). By the 1930s walleye had become the most abundant species on the river (Dupuis pers. comm.). Ryder (1957) found that a large portion of the population spawned in one area near the bridges at Nipigon, then dispersed throughout the bay, river, and Lake Helen and Polly Lake. Other spawning sites mentioned by anglers include the mouth of Purdom (Bass) Creek (Dupuis Ibid.) and below Alexander Falls (Ibid., Zygmunt Ibid.). When the population declined drastically in the early 1960s, Ryder (1968) attributed the

decline to mill effluents in the Bay that interfered with the movement of the fish. Other factors also may have contributed to the decline, including fishing (MacCallum and Selgeby, 1987). Anglers continued to see a few walleye spawning under the CPR bridge until 1970 (Smutylo Ibid.) and still see the occasional large one at Gapen's Pool (see Fig.1) and below Alexander Falls. Native walleye are caught very occasionally in the river and in Polly Lake. In 1986 the OMNR started a program of transferring marked adult walleye from various sources into Nipigon Bay and the river. A few of these fish are caught by anglers (Swainson pers. comm.). (The season for walleye is closed year-round, as of January 1, 1989.)

Northern pike

Another species that has declined drastically is the northern pike. In the early 1900s their numbers were thought to have increased dramatically and to be a threat to brook trout populations. They were the primary target of extensive coarse fish control programs, described below (p.21). The long-term affect on numbers is not known, but by the 1940s they were abundant in suitable habitat throughout the system. (Hill pers. comm.). In the mid 1970s harvests of northern pike declined (Dupuis pers. comm.). In the early 1980s during a period of low water levels (1981-1982?) pike fishing was good, then, abruptly, in subsequent years they seemed to be gone.(Zygmunt pers. comm.). Several sources recall that the most recent decline of northern pike throughout the system coincided with a couple years of high water levels. (1984-1986 had higher than average water levels).

Rainbow trout

Since the decline of the walleye the attention of the sports fishermen has turned to rainbow trout. They probably have been abundant in the river for decades, but were ignored by most fishermen until the mid 1970s (Dupuis Ibid., Ryder pers. comm.). Since then they have been the primary target species. In recent years the spring spawning run has declined somewhat (Smutylo pers. comm., Zygmunt Ibid.) and has been eclipsed in size and popularity by a vigorous, fall run that begins in late August. In the fall of 1988 rainbow trout were less abundant than lake trout during their fall runs. Whether this reflects a decrease in rainbow trout or simply the obvious increase in lake trout is not clear.

Pacific salmon

The most recent addition to the fish community has been the fall-spawning Pacific salmon. Pink salmon move into the river to spawn in odd-numbered years. The run was a sizeable one by the late 1970s. Over the past five years runs of chinook salmon have become

larger, beginning earlier each year. Pre-spawners were seen from August until late October in 1988. If the Nipigon River follows the trend seen on other large tributaries of Lake Superior, such as the Michipicoten River, further increases in the stock can be anticipated.

Sea lamprey

Larval sea lamprey were first collected in the Nipigon River in 1963, the timing attributed to "improved techniques and perseverance not initial occurrence" (Fisheries Research Board of Canada 1964). The first treatment of the "upper" river- between Alexander Falls and Lake Helen-took place in 1964 (Fish. Res. Bd. of Can. 1966). Larvae were found in Lake Helen, (near the mouth of the upper river), in the lower river in 1971 (Tibbles 1972), and in Polly Creek in 1978 (Goold pers. comm.). Goold (Ibid) comments that control of populations in the upper river is probably adequate, but treatment is less effective in the lakes, Helen and Polly, because of the large volume of water and inadequate exposure time of the larvae to the lampricide, and in the lower river because of its size, irregularity, and high flow rate. Scattered discrete populations of larvae probably escape treatments and inhabit these areas until they move out into Lake Superior (Goold Ibid.). Little is known about adult sea lamprey in the river, other than that they spawn there; their main impact may be the effect lake-dwelling adults have had on their target species.

Seasonal fish assemblages

A composite picture of the fish species currently targeted by sports fishermen on the lower river over the seasons would be roughly the following. In late April rainbow smelt, then spawning rainbow trout are running, followed by non-spawning brook trout. In August through December the main run of rainbow trout occurs. Chinook salmon are seen on their spawning run from August through October; this overlaps with the main run of brook trout. Beginning in September lake trout, lake whitefish, and, in odd-numbered years, pink salmon move into the river. Resident trout (rainbow, brook, and hatchery-raised lake trout) and lake whitefish, walleye, northern pike, white and long-nosed suckers, and yellow perch can be found in some locations at any time.

The relative importance of the various species in the creel in 1987 and 1988 is indicated in Table 3. The most sought after fish was rainbow trout, followed by brook trout and chinook salmon. By far the largest harvest was of rainbow trout, then chinook salmon, and lake whitefish, followed by brook trout and lake trout. The main fishery occurs in the fall, followed in size of effort by the summer fishery. The spring fishery is smaller than either of the other two.

The Human Element

Most of the changes in the fish community that have been identified have taken place in the context of an evolving post glacial environment and, most significantly, in an environment increasingly influenced by human activities. Several main phases of human history in the area, as it might affect the fish community, are evident.

Prehistoric and fur trade eras

Attempts to describe precisely the prehistoric human populations in the area are limited by the extremely sparse documentation of the archaeological record. This is the result of the changes that have taken place in the original landscape: flooding, construction of new shorelines, etc., and because of the lack of work done in the area, and does not necessarily indicate a lower level of use than other comparable river systems. (Arthurs pers. comm.).

Aboriginal people are thought to have been in the area, living along the margins of retreating glaciers, as early as 8000 BC (Harris 1987). Native populations living in harsh northern climates probably were sparse, and seasonally nomadic. Travel along the river would have consisted of families in search of adequate food in season, and stocking up for the winter where possible. This type of subsistence fishery continued up until recent decades (Wawia pers. comm.).

European fur traders arrived in the area in about 1684. After this time trappers and traders, who would have fished to feed themselves as they travelled their routes, would have added to the existing aboriginal fishery. Trading posts built along the Nipigon system (Voorhis 1930) would have funnelled fur trade-related traffic along the river. Despite numerous suggestions of earlier occupations, the earliest post at the mouth of the river that has been verified archaeologically dates from 1859 (Arthurs Ibid.).

Early documents written at that post report that the dominant traffic along the river continued to be related to the fur trade. "Goods were shipped to Red Rock House by steamboat to be redistributed northward throughout the ...hinterland via canoes and batteaux." (Hamilton and Brigham 1986). But during the late 1870s and early 1880s the post also became "an important outfitting station for "gentlemen anglers" who visited the Nipigon River to enjoy the renowned sports fishing of the area." (Ibid.).

Early Tourism.

By the late 19th century the fur trade had been overtaken by tourism as the primary focus of activity on the Nipigon River. Whicher's informative and idyllic account, issued by the CPR in 1888 invited the reader to come and bring the family. Enthusiastic accounts were written by fishermen, like Millard (1917), who heeded such advice. Annual Reports of the Department of Fisheries and its successor, the Department of Game and Fisheries, for the years from 1900 through 1908, presented a picture of an active sports fishery in which the comfort and convenience of the tourists, as well as the continued success of the brook trout fishery that drew the fishermen to the area, were the major concerns. It is possible to make "ball park" estimates of the numbers of people involved. Based on the revenues from fishing permits that were reported (Table 3), and extrapolating from one year for which exact numbers of permits were given (1901), I calculated that between 70 and 126 tourists spent from two to four weeks on the river each year between 1900 and 1915. These estimates would not include guides, etc. who appear to have been an integral part of any fishing trip. In 1901, a "poor" year, the overseer estimated that tourists had spent \$9000 in Nipigon, excluding rail and steam travel and hotel expenses (Anon. 1902). Because of changes in the format of annual reports, information on revenues (and indirectly on numbers of fishermen) is not available after 1915. The next official mention of the Nipigon River fishery was in the Report of the Special Commission on the Game Fish Situation (MacDiarmid 1930) in which reference was made to declines in the fishery. By this time a number of changes had taken place in the area that probably had begun to change the face of the river and its tourist traffic.

Access, Population, Fishing Pressure

Access to the area changed significantly between 1885 and 1915. Prior to 1885, the primary access was by steamboat across Lake Superior. In 1885 the CPR bridge across the Nipigon River was built and the community was linked to the rest of the country by a soon-to-be-completed transcontinental railway. In 1908 a transportation network was put in place between the mouth of the river and Lake Nipigon to carry supplies for the construction of a rail line of the National Transcontinental, now the CNR, being built north of Lake Nipigon. The various elements are described in detail by Todd (1977) and included a wharf under the CPR bridge, where steamers unloaded supplies onto primitive car ferries that carried them up river to Alexander Landing. From Alexander Landing a narrow-gauge railway, the Nipigon Tramway, ran overland for 18 miles to South Bay on Lake Nipigon.

Work on the northern line was completed in 1909 (Brill pers. comm.). Construction was underway by 1912 on a southern line from Port Arthur to Capreol; that ran from Longlac to Nakina along the eastern shore of Lake Nipigon, providing rail access at Orient Bay. Transcontinental passenger service began to move along this line in 1915 (Todd Ibid.). The northern and southern routes were linked in 1923 (Brill Ibid.) by a spur line; with this came re-routing, and Nipigon was no longer on the main line.

Some of the potential impacts on the fishery of all these changes were reported in the annual overseers reports. The increased traffic along the river below Alexander Landing was seen as a threat to the spawning beds (Anon. 1906) although the tramway was thought not to affect the river (Anon. 1908). It also was hoped that the improved access would bring more tourists (Anon. 1910). Other impacts that were not commented on were the dredging of a deeper channel into Nipigon Bay in 1908, and major alterations (see p.17) in the shoreline and the course of the river at the village of Nipigon (Todd Ibid.).

If the railways opened the area to tourism between 1885 and 1915, it was not until 1920 that roads made the area more accessible to residents of the region. In that year Cameron Falls was linked to Nipigon by road. In 1950 that road, Hwy 585, was extended to Pine Portage. In 1920 a road also was begun between Port Arthur and Nipigon. That highway did not extend further east to Schreiber until 1937 when the highway bridge was built across the Nipigon River (Brill Ibid.). The road to Geraldton, along the east side of the river and lake, now Hwy 11, was built shortly thereafter. The southern route of the Trans Canada Highway, Hwy 17, was not completed to Sault Ste. Marie until 1961.

Not only was access changing, but between 1923 and 1973 the numbers and locations of local residents were in a state of flux that is summarized in Table 4.

The major centre, the village (now town) of Nipigon doubled in population, from 953 to 1897, between 1933 and 1950. During the period from 1958-1968 construction (of the transcanadian gas pipeline and highway, and expansion of the mill at Red Rock) added another thousand people to the population (Wheeler pers. comm.). Since then the population has declined, then stabilized, the most recent census reporting 2315 people (Wheeler Ibid.).

The Indian Reserve now at Lake Helen was located at Parmachene early in the century. At that time guiding tourists was a major source of income, and subsistence fishing on the

river probably was carried out much as it always had been. Jack McKirdy, a local outfitter and guide, recalled that he rarely sold nets; the Indian women made their own and fished the fall spawning-runs for winter food for their families and dogs (Townes pers. comm.). B. Wawia (pers. comm.) gave the following description of Parmachene, and of the Indian subsistence fisheries on the river and in Lake Helen. When local freight-train service to the community was discontinued, the residents, about 15 families, dispersed to other locations. In 1950 ten new houses were built at Lake Helen which, together with the seven families already there, formed the nucleus of what would become the new reserve (M. Wawia, pers. comm.). Fishing on Lake Helen was bountiful and a staple source of food for a few years, then declined, as the fish became scarcer and as interest in fishing waned (B. Wawia Ibid.). The current level of subsistence fishing on the lake is being determined in discussions between the fishermen and OMNR district staff (Swainson pers. comm.).

The colony at Cameron Falls, begun in 1920 when four houses were built, had a population of 150 in 1943 (Hydro-Electric Power Commission of Ontario (HEPC) 1943), and 90-100 when it was relocated to Nipigon in 1972 (Douglas pers. comm.). Log drive camps located along the river (at Virgin Falls, Pine Portage, and Cameron Falls) and on Lake Helen typically housed about 75-80 men (Hill pers. comm.). The construction camp at Pine Portage housed 1300 workers from 1948-1950 (HEPC Aug. 1950).

Although surprisingly large numbers of people were housed in camps and colonies along the river for 50 years, residents of those camps from the 1940's until 1972/73 recall that few people were interested in fishing (Douglas Ibid.; Hill Ibid.). Two periods of increase in fishing pressure have been observed by various local fishermen. The first, after 1950, was attributed to increased leisure time (Dupuis pers. comm.). The new road to Pine Portage also was thought to have contributed to the increase in fishing above Cameron Falls at that time (Hill pers. comm.). The second increase, which was first noticed in the mid 1970's, coincided with increased fishing for rainbow trout, and, more recently, and chinook salmon in the lower river (Smutylo pers. comm.).

Habitat Changes

Hydro-Electric developments

The Nipigon River has undergone major physical changes since the days when world-record brook trout lurked in its pools. Chief of these was its development as a major producer of hydro-electric power. Table 5 (from Near 1982) chronicles the installation and extensions that occurred between 1920 and 1958 at Cameron Falls, Alexander, and Pine

Portage, respectively. The following data (given in the original units of feet above sea level) also are reported in that document:

	<u>Pine Portage</u>	<u>Cameron Falls</u>	<u>Alexander</u>
Headwater Level			
Max.	854.25	746.5	668.5
Min.	846.0	744.0	661.0
Tailwater Level			
Max.	749.8	674.3	614.0
Min.	744.0	668.5	603.0
Operating Head (gross)	100-110 ft	73-74 ft	58 ft

Details of the construction and operation of the developments are contained in annual reports of the HEPC and various clippings etc.(collected in Supplemental Report No. 3).

With the Cameron Falls development in 1920 (originally referred to by the HEPC as the Nipigon Development) the increase in water levels created a new East Arm, flooded the Narrows, and extended Jessie Lake over the former basin of Lake Marie. It created a "headpond four square miles in area, extending 12 miles upstream." (HEPC 1926). In 1925 a storage dam was built at Virgin Falls. A special committee reporting to the government in 1930 on the game fish situation in Ontario (Macdiarmid, 1930) refers to "the Nipigon river.the upper and middle portions of which have been greatly modified and, in the opinion of many, ruined by power dam development". The dam and powerhouse at Alexander (originally referred to as Cameron Falls, lower site), which began operating in 1930, resulted in the flooding of a much smaller area. Pine Portage dam, built in 1950 with an operating head of 100-110 feet, flooded all the noted rapids upstream to Virgin Falls: White Chute, Victoria Rapid, Devil, Rabbit, and Miner's Rapids. The dam at Virgin Falls no longer served any function and was breached.

The building of these dams were major projects, involving the construction of railway lines and bridges, access roads, townsites, transmission lines, temporary coffer dams, diversion channels, and power houses, as well as the dams themselves. The progress of the individual developments are described in the Annual Reports of the HEPC (1919 -1958). The indirect effects of the developments on the fisheries: increased access, townsites at Pine Portage and Cameron Falls, etc., already have been discussed.

Water level fluctuations

In addition to short term disturbances in the areas under construction, loss of habitat near the dam site, and creation of upstream impoundments, the dams can affected habitat through their regulation of water levels in the system. Because the function of a dam is to store water when it is available and release it when needed, in principle, dams reduce the seasonal fluctuations in water levels. But they also have the capacity to cause short term episodes of high or low water downstream.

Dramatic fluctuations, of as much as three meters in less than an hour, were mentioned as a major environmental problem by every fisherman interviewed. The potential of such fluctuations to cause a loss of eggs at those times of year when they are incubating in the spawning beds is obvious, an effort to evaluate this phenomenon was initiated in 1988. Water level records for the system are being analysed by OMNR personnel as part of an evaluation of the impact of water level fluctuations on brook trout spawning beds. Other potential impacts, such as increased erosion, sedimentation, and turbidity have not been studied.

The constraints on water level fluctuations that are currently in effect are quoted from Ontario Hydro (Near 1982.):

"Lake Nipigon, with a storage range from 846 to 855 feet, has a regulated outflow of 11,500 cfs. When the lake level reaches 846, outflows are reduced to balance inflows. Under the present operating pattern, flow at Pine Portage is limited to 20,000 cfs. There is a limiting river operating rule to the effect that discharge at Alexander must not exceed 22,000 cfs. This limitation was established to control erosion in the river section downstream from Lake Helen and in the general vicinity of the railway bridge and to suit the requirements, lower river, for navigation."

Erosion is noticeable elsewhere along the lower river where it flows past clay banks. Deposition of sediments is also visible along the lower river. Residents point to the outflow into Lake Helen and Gapen's Point as the areas in which they have observed the greatest changes. One potential source of additional information on the extent to which the river is being altered by erosion / deposition is aerial photographs. A request is being made to OMNR, Toronto by OMNR, Nipigon District for prints from aerial surveys done in 1947, 1962, and 1975.

The erosion undoubtedly has been enhanced by the diversion of water into the system from the Ogoki Reservoir. Completed in 1943, the Ogoki Diversion is capable of increasing the annual dependable flow in the river by 50 percent, from 8,000 cfs to 12,000 cfs. (Townes 1972). Near (Ibid) describes how the diversion is operated in terms of the constraints and how they are met.

Log drives

Logs were run on the river for fifty years, from 1923 to 1973. The operation, outlined below, was described by Douglas and Hill (pers. comm.). Logs from between two and six different companies were brought down-river by men who worked for Abitibi. The drives extended over a season that began with "ice out" and lasted until late September. There usually were from six to nine individual drives per season. Logs were stored above Virgin Falls before each drive. They were run over those falls, and the ones at Pine Portage, then held between Split Rock and the narrows above Lake Jessie; they then were towed down the lake by tug to Cameron's Pool, above the falls, where they were held again. From there they were run to Lake Helen where they were stored until they could be towed to a mill on Lake Superior.

There were several potential effects of the drives on the fish community. Short-term impacts included the increases in water level that accompanied the running of logs through the chutes at the dams, and the presence in the water of large amounts of fast-moving logs. Secondly, the drives kept most fishermen off the river and, in the opinion of several, reduced fishing pressure. The third, and, in the opinion of most of the fishermen with whom I spoke, most important, effect was that the storage areas provided cover and a food-rich environment for fish. Several individuals spoke of large may-fly hatches emerging from under log booms, and of the concentrations of fish that they attracted.

The effects of log drives and booming that have been of the most concern to fisheries biologists have been the destruction of spawning substrate by the scouring action of the logs as they are swept down-river, and the accumulation on spawning beds of large amounts of bark and woody debris. This is suspected of having destroyed lake whitefish habitat around Lake Superior (Lawrie and Rahrer 1972) and may account for the disappearance in the 1920s and 1930s of lake sturgeon from Lake Helen. (The smallmouth bass also disappeared from Lake Helen during this period.). Hill (pers. comm.) estimates that less than two percent of the wood run down the river remained in the Nipigon system and that the total annual volume of the drives ranged from 200,000 to 400,000 cords, with

485,000 cords being the most ever run in a year. These figures would suggest that large amounts of allochthonous material were introduced into the system over the years. However, the current appears to have swept clean any areas of river bottom that are visible from the surface. Fine organic material is washed up along the shoreline of Lake Helen. Larger woody material has been taken in bottom grabs, using a hand-held dredge, in a variety of locations around Lake Helen (Dupuis pers. comm.). He encountered thin layers over bottom sediments, not thick deposits. Other sources of anecdotal information about the fate of this material have not been explored.

Changes in the channel in the lower river

Major alterations were made to the river channel below Lake Helen early in this century. Originally the river flowed through what is now known as the Lagoon; this was the site of the first rapids on the river. The Hudson Bay Post was located near the portage around these rapids. When the Canadian Northern Railway (now the Canadian National Railway) built its line through Nipigon in 1912 it created its current roadbed by extending the shoreline, and by building a retaining wall and a causeway, (Todd 1977), thereby creating the Lagoon.

Other disturbances of the river bottom undoubtedly accompanied the construction of the railway bridge in 1884-1885 and the highway bridge in 1937. In recent decades obstructions in this section of the river, combined with log booms and ice jams to cause flooding that washed out islands of sediment (Wheeler pers. comm.).

Water Quality

Water quality monitoring

Although water quality in the bay has been a major concern (*see* Vander Wal, et al., 1989. for summary), water quality in the river has been less severely affected.

A survey of water quality as well as the biota of the bay was conducted in 1966-1967 in response to concerns about fish tainting and other issues associated with the waste outfall of the newsprint mill in Red Rock (German 1968). The results of sampling done in Forgan Lake, Jessie Lake, Lake Helen and in the lower river also were reported.

Routine sampling of the river has been conducted by (OMOE) since 1973 at one site, beneath the Highway 17 bridge. Data from that monitoring are given in Appendix 5. Figures 2-9 are graphs that summarize the data for key parameters. A visual inspection

(rather than statistical analysis) of these graphs suggests that, if anything, there may have been modest decreases in biological oxygen demand (BOD), and copper, and possible increases in pH and conductivity.

An earlier data set from the same location (Appendix 5) consists of samples taken by R. A. Ryder. In 1976 and 1978 he observed thick mats of a cladophora-like algae, and sediment over the rocks which formerly had been the walleye spawning grounds. His field notes (Appendix 6) report that "...spawning ground conditions were indicative of increased upstream loading- especially phosphates. The source is undetermined...".

Sewage treatment

Downstream from the town of Nipigon the sewage treatment plant discharges its effluent into the river. Before the plant was built sewage drained from septic tanks into what is now known as the Lagoon. Algal blooms occurred and fish populations in the Lagoon disappeared (Dupuis pers. comm.). By the 1940s or early 1950s a treatment plant was built and outflows were relocated to the present site (Wright pers. comm.). OMOE personnel recall that by the 1970s it had become overloaded, resulting in problems such as too short a settling time. It was expanded and the chlorine contact time was increased in the early 1970s. The plant is considered to be effective at providing adequate primary treatment (Ibid.).

Contaminants

Contaminant problems have not been identified in the river. However, species of fish that move between the bay and the river have been identified in the bay as having problems. These are summarized in Vander Wal (Ibid.). they include tainted fish flesh during the 1960s because of phenol levels, and elevated mercury levels in yellow perch.

Sea lamprey control

Because there are larval sea lamprey throughout the system below Alexander Falls, lampricides have been applied to various parts of the system. Details about these treatments, summarized below, are reported in Appendix 7.

TFM with powder Bayer 73 is used on the 12.9 km. stretch of river between Alexander Falls and Lake Helen. It is applied at the falls and carried downstream with the current. These treatments are dependent on the ability of Ontario Hydro to reduce the flow to about 50 cms (cubic meters per second) for 24 hours. Five such treatments have been carried

out, in 1964, 1970, 1975, 1981, and 1986. The lower river was treated with TFM and powder Bayer 73 in 1983.

Granular Bayer 73 is used as a survey tool on the upper river and on Cash and Polly Creeks and as a treatment tool in the areas that are hard to treat with TFM/ powder Bayer 73: Lake Helen and Polly Lake and the river below Lake Helen. Discrete, small areas are treated; the material sinks to the bottom. Granular Bayer has been used on the upper river for 14 years out of the past 20. It has been used on the lower river every year from 1974 to 1978, in 1981, and yearly since 1983. The areas treated ranged from 0.5 to 10.2 hectares. In recent years Lake Helen and Polly Lake also have been treated.

Although the control of lamprey populations is essential to the recovery of whitefish and lake trout, and other species, the repeated use of biocides on tributaries has raised concerns about the effect of those treatments on non-target species. A panel of scientists was convened to evaluate information on the fate and effect of lampricides, and to identify gaps in scientific information.

They found the most susceptible species of large fish to be suckers (other species listed by them are not found in the Nipigon River), with northern pike, walleye, and salmon affected occasionally. Among forage fish, johnny darters were reported occasionally to suffer some mortality (Panel on TFM and Bayer 73 1985). Sea Lamprey Control Centre has recorded trout-perch mortality in conjunction with its treatments on the Nipigon (Tibbles 1983). Mortality in other species is noted in field notes, and a list of the species involved will be provided when a review of those notes has been completed (Goold pers. comm.).

In evaluating the impacts on invertebrates the panel found that Bayer 73 is more toxic to a larger number of organisms, than TFM, or the mixture of the two. They conclude that "a localized impact on sensitive invertebrate species would be expected" but that "its use is confined to small portions of streams and lentic habitats" and "because invertebrate populations have apparently not been eliminated, some mechanism of recolonization must be available." (Panel Ibid.). Given the localized nature of the effects of Granular Bayer, and its repeated use on the system, it would seem prudent to evaluate in terms of their value as fish habitat any specific areas that are treated repeatedly, and to consider further action on any that provide significant habitat.

Black fly control

Black flies were a major pest for the people living at the Cameron Falls Colony. To alleviate this problem, a black fly control program was undertaken, perhaps as early as 1948 (HEPC 1949). A resident who worked on the program recalls it as follows (Douglas Ibid.). It consisted of dripping DDT directly into any creek within 8 kilometers (5 miles) of the community twice a week during black fly season. Most of the treated creeks were on the west side of the river, with Polly Creek the notable exception. Treatments took place at one station per creek for the smaller ones and more on larger streams. Frazer Creek was the most heavily treated, with three stations. The objective of each treatment was to achieve a specified concentration of DDT in the water. The program was discontinued in the late 1960s. The HEPC reported (1967) that it was evaluating the use of organo-phosphorous compounds as alternative larvicides, but there is no evidence that they were used on the Nipigon system.

In the late 1950s and early 1960s aerial spraying, probably of DDT, was conducted on a few occasions near the colony of Cameron Falls (Douglas Ibid.).

Fisheries Management

Overseers reports

An early Commissioner's Report (1892) lists nine overseers for the Province, including William McKirdy for "the Nipigon (sic) River, Lake Nipigon and adjacent waters". Although their duties are not described, subsequent annual reports (Anon. 1900-1910) indicate that they enforced regulations by patrolling the river, and reported on revenues and the condition of the fisheries. Between 1900 and 1908 the main concerns identified in their reports were: improving and maintaining the condition of portages and camp grounds; controlling coarse fish; and promoting the ideas of a forested preserve along the river and of using Nipigon trout to rebuild depleted brook trout populations. No reports were submitted from Nipigon waters for 1911, 1912, or 1913; only brief reports were included in the annual reports for 1914 and 1915, after which time the overseer reports disappeared from the annual reports.

Coarse fish control program

Netting of coarse fish on their spawning beds was initiated in 1902 (Anon. 1903) in response to increases in their numbers, especially northern pike, and the observation that they had taken over choice pools, such as Victoria (Anon. 1902). The fish destroyed in 1902 included 1800 pike, 389 walleye, and 803 suckers (Anon. 1903). The program continued through at least 1905, when 7632 pike, 2282 suckers, 228 walleye, and 145

whitefish were destroyed (Anon. 1906). The existence of a control program was reported again in 1914 and 1915 (Anon. 1915, 1916).

Sports-fishing permits

The existence of a special sports-fishing permit for the Nipigon River, Lake Nipigon, and adjacent waters predates 1900. Revenues generated from the permits, about 1000 dollars per year, are listed in Table 3. A commission appointed to enquire into matters pertaining to game fish, fisheries, and game in Ontario (Anon. 1912a) discussed at length the merits and disincentives of the high cost of the permits. At that time they cost residents five dollars for two weeks or ten dollars for the season; while non-residents paid 15, 20 and 25 dollars respectively for two, three, or four weeks. Despite its recommendations that the cost to residents be reduced, the fee structure was still in place in 1919 (Ontario Game and Fish Laws 1919). The permits were discontinued at the end of 1932 (Ontario Game and Fish Act 1933).

Daily limits

A comprehensive review of the regulations may be undertaken by OMNR district staff. Therefore this report does not include a review of the regulations; the information collected below was gleaned from the reports (Anon., 1892 to 1946) and from district staff.

In 1919 the daily limit for brook trout was 30 fish or 10 pounds, and the season was closed from September 15 to the following April 30th. The limits were reduced at some point (unknown). In 1980 it changed from 15 fish or 10 pounds plus one fish, to simply 15 fish. The limit was reduced to four brook trout in 1981, and, again in 1989 to two fish.

As of January 1, 1989 there is no open season for walleye fishing in Nipigon Bay, the Jackfish River, and the Nipigon River system up to the Alexander dam.

The daily limits for walleye and brook trout are more restrictive on the Nipigon River than on most other waters in the district; this has been the case for many years. Other species are subject to the same daily limits as most other waters in the district.

Stocking

For many years the primary management activity reported on the river was stocking. The following information was extracted from the annual reports of the Game and Fish

Department (Anon. 1900-1945) and from OMNR files, Nipigon District. The report for 1930 was missing, and no data are available for 1945-46. The data are tabulated in Table 6.

The first reported stocking was of brook trout, in 1921. They were stocked as fry and fingerlings every year through 1940 for which records were available. The report format used in the 1940s does not identify where within a district fish were stocked. During the 1950s and 1960s they were stocked 12 times and at several locations. With a minor exception in 1974, no brook trout were stocked again until 1982. Since that time they have been stocked every year.

Arctic grayling were stocked once, in 1959 at Alexander and Cameron Falls.

Lake trout were stocked in 1950 at Cameron Falls and Pine Portage, and into Jessie Lake on nine occasions. In the lower river a few were stocked in 1982, then numbers increased in 1984 and again in 1985. This stocking occurs in connection with the stocking that takes place on Nipigon Bay each fall. When ice forms on the bay, any lake trout that remain to be stocked are placed in the river (Townes pers. comm.)

In 1983 walleye were stocked in the lower river as fertile eggs; in 1985, as fingerlings; and in 1986 and 1988 as adults. This occurs in conjunction with the stocking efforts on the bay.

Walleye research and management

A study was conducted by Ryder (1957) to determine the discreteness of Nipigon Bay and river populations, as well as population numbers and other characteristics. He determined that the majority of the fish spawned in the lower river, and identified a definite pattern of migration. He estimated an adult population of about 123,000 fish. In a later report Ryder (1968) evaluated the dynamics and exploitation of the population to conclude that its decline was "most likely attributable to industrial pollution rather than over-exploitation or sea lamprey predation.". In recent years efforts (see "Stocking", above) have been made to rehabilitate the population in the bay.

Index netting

In order to assess efforts to rehabilitate the walleye population of Nipigon Bay (and Nipigon River) the OMNR conducted an index netting program from 1985 through 1987. In May of 1986 ten species, including only one walleye, were caught in the lagoon in nine days of trap-netting.(Table 7) (Furlong 1986). Additional netting also was done in the bay, at past and proposed future sites of stocking.

Other netting

In July 1986 seine nets were used in one location on the river and in Lake Helen and Polly Lake, as well as in three locations in the bay. These catches were dominated by trout - perch and assorted shiners, with yellow perch and smelt (Table 7) (OMNR. 1986). In 1987 standard index gill-nets were set in Lake Helen to determine whether walleye were migrating into Polly Lake, as described by Ryder (1957). Ten adult walleye were caught along with 175 fish of eight other species (Table 7) (OMNR 1987). Since their origin was unknown no conclusions can be drawn concerning their migration pattern.

Electrofishing

In August 1986 and July 1987 electrofishing surveys of fish together with an evaluation of the fish habitat were conducted in Nipigon Bay and the lower river. This inventory of biological communities, and aquatic habitat, is part of the information required for the preparation of individual Remedial Action Plans (RAPs) for AOCs (Hamilton 1987).

Results of the two surveys are compared by Dalziel (1988). Twenty five species (plus one unidentified) were collected in 1987 (*see* Table 1), compared with 19 (plus one hybrid), collected in 1986. Sites of high habitat diversity and high catch-per-effort were identified, as well as a nursery area (species unspecified) at the outflow of the river into Lake Helen.

Habitat Mapping

Maps were produced in the fall of 1987 (OMNR files Nipigon District) that show spawning areas, including historical, potential, and observed sites, and nursery areas downstream from Lake Helen (Fig 10) and between Alexander Falls and Lake Helen (Fig 11).

Brook trout spawning

In 1988 a study of brook trout spawning sites was initiated by OMNR staff, Nipigon District . They have been successful in identifying active brook trout redds, and are monitoring the impact of fluctuating water levels on those sites (Swainson pers. comm.).

Co-operative Angler Program

In an on-going district-wide program, anglers have volunteered to record details of their fishing activities in diaries issued to them by OMNR staff. At selected times the diaries are turned in and the information is analysed. By the end of 1988 sixty-two anglers had turned in diaries; 16 of these reported fishing on the Nipigon River.

Fisheries Management Plan

Since 1986 the OMNR District has been developing its fisheries management plan. The major fisheries problem that has been identified by the public during this process is the decline of the brook trout. The plan (OMNR 1989) says:

"brook trout will be the priority species on the Nipigon River and the other Lake Superior tributaries, with secondary attention to chinook and rainbow trout. The focus will be on enhancement of spawning habitat and protection of spawning populations.

Walleye will be a priority in Nipigon Bay through the ongoing rehabilitation program to restore a self-sustaining population."

Lake Nipigon Region Parkway Authority

Although not a fisheries management initiative, the proposal to develop a parkway has significant implications for fisheries management throughout the Nipigon River System. The concept involves improving the access and developing shoreline sites along the Nipigon River and the waterfronts of both Nipigon and Red Rock, and around Lake Nipigon. The objective of such improvements would be to provide improved recreational opportunities for local residents, and to serve as "a major attraction, for visitors from elsewhere, adding considerably to the development of tourism in the Nipigon area." (Lake Nipigon Region Parkway Working Group 1987). The proposal states that most existing tourist businesses are small, under-capitalized, and marginal, with a few that are successful; and that until very recently tourism has been seen as a minor sector of the economy of the region, an "add on" (Ibid.). It anticipates declines in other sectors, and sees the expansion of tourism as the most feasible way to counteract the effect on the local economy of these declines

Benefits of the Aquatic Resources

Aquatic resources have been an integral part of many phases of development in the Nipigon area. The river has served as a transportation corridor, and was a magnet for early tourism

that generated as much as ten thousand dollars (in turn of the century-valued dollars) a year in local revenues. It provided local employment for more than fifty years for those working in hydro-related jobs and on the log drives. It continues to generate some employment, revenues for Ontario Hydro, and electricity for the homes and industries of northwestern Ontario. It is a source of drinking water and recreation to area residents. To some, living near the Nipigon River gives a special meaning to their community, and to their way of life. For some native people this link is an important part of their cultural tradition. Since the 1970s more tourists again are attracted to the river and its fisheries; some of the local residents now are looking to their waterfronts to bring economic diversity and growth to their area.

DISCUSSION

Although the primary objective of this document is to summarize existing information, certain questions and insights emerged in the process of gathering and evaluating the relative importance of that information. Any insights almost always led to more questions. Nonetheless comments and suggestions for the future, based on tentative deductions about the past, gradually took shape, and are recorded below. This discussion is neither conclusive nor comprehensive; rather, it is somewhat speculative.

For management purposes it seems most effective to consider the system as several relatively discrete sections. The sections, and management implications in each are outlined below.

Concern over declines in brook trout populations is well founded. However, declines will be impossible to reverse completely, since most of the prime habitat (especially upstream from Pine Portage) no longer exists.

Upstream of Virgin Falls, effectively part of Lake Nipigon, could be evaluated in terms of what remains of its capacity to support an exceptional brook trout stock. Preliminary indications of whether or not its potential has been reduced significantly by the elevated water levels on Lake Nipigon are conflicting.

The area between Pine Portage and Jessie Lake seem to have undergone less physical change than any other section of the river. Increased fishing pressure, combined with the curtailment of any movement of fish into the area from upstream, may account for most of the changes in the fisheries that have occurred since 1950. The other stress that may have

affected this section of the river is water level fluctuations. It would be useful to know what factors currently limit this brook trout population; whether, for example, providing additional spawning substrate would benefit the population. Of all the sections of the river, this one seems, at least at first glance, to have the greatest potential for an increase in the amount of high quality brook trout fishing it can provide.

Such restoration may not be possible downstream from Alexander Falls. When compared with some severely degraded environments the river is still regarded as having high water quality and fish habitat potential (Dalziel 1988); nonetheless this portion of the river may have changed irreversibly since its heyday.

It has undergone visible changes in habitat as a result of water level fluctuations, erosion and sedimentation, dredging, and scouring. It has experienced the most dramatic changes in angling pressure of any section of the river, and has been influenced by changes in water quality and in the biotic community of the adjacent bay. Subtle changes also may have occurred: water quality parameters such as (possibly) turbidity, may have changed as a result of increased flow rates from the Ogoki diversion; the accumulation in places of woody material; and lamprey control efforts may be having significant localized impacts.

Regardless of which combination of factors led to the decline of the brook trout in this section, the presence of rainbow trout and Pacific salmon seems destined to restrict the numbers of brook trout in the future. Efforts to determine physically (e.g. spawning beds) and functionally (e.g. food relationships) where the overlaps occur, and to protect brook trout where they seem to have the best chance of out-competing other species might be the best way to ensure their continued existence, at least on a limited basis, in this section of the river. Ideally one would like to know the patterns of movement of the fish, whether any of the habitats they occupy are marginal, and if so, in what way; where competition occurs and for what; and what trends, such as climatic warming, or improved water quality might alter this pattern. Site-specific measures, such as protecting and/or enhancing individual spawning beds might be necessary. The stresses that have been identified in this report that might be active on a site-specific level include water level fluctuations, siltation, disturbance of redds and spawning fish by fishermen, degraded water quality (e.g. algae growth on spawning sites in the lower river), and the site-specific effects of granular Bayer 73. All of these stresses potentially would affect all the three groups of fish mentioned, but perhaps to different degrees.

If brook trout are to be protected successfully in the lower river it would seem to require not only diligence on the part of the fisheries biologists, but also a consensus on the part of the residents, fishermen and municipal planners that the effort was warranted. The first step in developing such a consensus might be a careful examination of the relative potential of brook trout, rainbow trout, and Pacific salmon, in the lower river, and the associated benefits and costs (not necessarily monetary costs) of each.

The implications of trying to restore walleye to the lower river appear to be more evident. The annual patterns of movement of the original stock were better documented. Competition from other species is potentially less of a problem than for the brook trout. What remains to be seen is whether stresses such as water quality (in both the river and the bay), availability of adequate spawning substrate, and fishing pressure are sufficiently reduced to allow the species to re-establish itself.

A non-site-specific stress that demands consideration in the long-term plans of fisheries managers, fishermen, and municipal planners is fishing pressure, and the level of fishing effort that can be sustained by the various species. It is important that the three groups work together to achieve mutually acceptable targets, especially given the suggestion that increases in fishing pressure were, at least in part, responsible for declines in some of the fish stocks on the river.

Although Lake Helen is contiguous with the lower river, the fish community and the stresses it has experienced may be sufficiently different from other parts of the system to warrant separate consideration. This study has not reviewed enough information about the lake and its fisheries to develop an adequate picture of that system. Speculation that it is "different" stems from three factors: it is a lake, and the impacts of sedimentation, and of the accumulation of woody debris from log booming would be different than in the river's currents; the fish community has a more distinctly resident component, as well as the migrants ; and it has been subject to a gill-net fishery, as well as a sports fishery. The superficial treatment given to Lake Helen in this report is indicative only of the mandate of this report, not of the significance of the fish community of the Lake Helen

With all of the uses and expectations currently focused on the river, what are the implications for environmental remedial plans and for fisheries management? What conflicts can be expected? What benefits must be protected? What benefits can be restored? What new uses can be provided? How are those decisions to be made? These

are the questions that face resource managers. To assist them, and the public, in identifying the opportunities and challenges that face them, this report has attempted to bring together existing information, and to pose some of the apparent questions.

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REFERENCES

- Anon. 1892. Ontario Game and Fish Commission. Commissioners' Report.
- _____. 1900. First Annual Report of the Fisheries Branch of the Province of Ontario for 1899.
- _____. 1901. Second Annual Report of the Fisheries Branch of the Province of Ontario for 1900.
- _____. 1902. Third Annual Report of the Fisheries Branch of the Province of Ontario for 1901.
- _____. 1903. Fourth Annual Report of the Fisheries Branch of the Province of Ontario for 1902.
- _____. 1904a. Fifth Annual Report of the Fisheries Branch of the Province of Ontario. 1903.
- _____. 1904b. Report of the Deputy Commissioner of Fisheries for the year 1903.
- _____. 1905. Sixth Annual Report of the Fisheries Branch of the Province of Ontario. 1904.
- _____. 1906. Seventh Annual Report of the Fisheries Branch of the Province of Ontario. 1905.
- _____. 1907. Eighth Annual Report of the Fisheries Branch of the Province of Ontario. 1906.
- _____. 1908. First Annual Report of the Game and Fisheries of the Province of Ontario. 1907.
- _____. 1909. Second Annual Report of the Game and Fisheries of the Province of Ontario. 1908.
- _____. 1910. Third Annual Report of the Game and Fisheries of the Province of Ontario. 1909.
- _____. 1912a. Final Report of the Ontario Game and Fisheries Commission 1909-1911.
- _____. 1912b. Fifth Annual Report of the Game and Fisheries of the Province of Ontario. 1911.
- _____. 1913. Sixth Annual Report of the Game and Fisheries of the Province of Ontario. 1912.
- _____. 1914. Seventh Annual Report of the Game and Fisheries of the Province of Ontario. 1913.
- _____. 1915. Eighth Annual Report of the Game and Fisheries of the Province of Ontario. 1914.

- _____. 1916. Ninth Annual Report of the Game and Fisheries of the Province of Ontario. 1915.
- _____. 1917. Tenth Annual Report of the Game and Fisheries of the Province of Ontario. 1916.
- _____. 1918. Eleventh Annual Report of the Game and Fisheries of the Province of Ontario. 1917.
- _____. 1919. Twelfth Annual Report of the Game and Fisheries of the Province of Ontario. 1918.
- _____. 1920. Annual Report of the Department of Game and Fisheries. 1919.
- _____. 1921. Annual Report of the Department of Game and Fisheries. 1920.
- _____. 1922. Annual Report of the Department of Game and Fisheries. 1921.
- _____. 1923. Annual Report of the Department of Game and Fisheries. 1922.
- _____. 1924. Annual Report of the Department of Game and Fisheries. 1923.
- _____. 1925. Annual Report of the Department of Game and Fisheries. 1924.
- _____. 1926. Annual Report of the Department of Game and Fisheries. 1925.
- _____. 1927. Annual Report of the Department of Game and Fisheries. 1926.
- _____. 1928. Annual Report of the Department of Game and Fisheries. 1927.
- _____. 1929. Annual Report of the Department of Game and Fisheries. 1928.
- _____. 1930. Annual Report of the Department of Game and Fisheries. 1929.
- _____. 1932. Annual Report of the Department of Game and Fisheries. 1931.
- _____. 1933. Annual Report of the Department of Game and Fisheries. 1932.
- _____. 1934. Annual Report of the Department of Game and Fisheries. 1933.
- _____. 1935. Annual Report of the Department of Game and Fisheries. 1934.
- _____. 1937. Annual Report of the Department of Game and Fisheries. 1935-36.
- _____. 1938. Annual Report of the Department of Game and Fisheries. 1936-37.
- _____. 1939. Annual Report of the Department of Game and Fisheries. 1937-38.
- _____. 1940. Annual Report of the Department of Game and Fisheries. 1938-39.
- _____. 1941. Annual Report of the Department of Game and Fisheries. 1939-40.
- _____. 1942. Annual Report of the Department of Game and Fisheries. 1940-41.

- _____. 1943. Annual Report of the Department of Game and Fisheries. 1941-42.
- _____. 1944. Annual Report of the Department of Game and Fisheries. 1942-43.
- _____. 1945. Annual Report of the Department of Game and Fisheries. 1943-44.
- _____. 1946. Annual Report of the Department of Game and Fisheries. 1945-46.
- Cox E. T. 1978. Counts and measurements of Ontario lakes. OMNR .
- Dalziel, R. I. R. 1988. Survey of critical fish habitat within International Joint Commission Designated Areas of Concern, June-October, 1987. for OMNR. 84 p.
- Dymond, J. R. 1926 The fishes of Lake Nipigon. Univ. of Toronto Studies: Biol. Series, Pub. Ont. Fisheries Research Lab., No. 27.
- Dymond, J. R., L. L. Snyder, and E. B. S. Logier 1928. A faunal investigation of the Lake Nipigon Region, Ontario. Trans. Roy. Instit. Vol. XVI, Part 2: 233 -237.
- Fisheries Research Board of Canada 1964. Lamprey control experiment in Canada. Annual Report for 1963. Great Lakes Fish.Comm. p. 24-29.
- _____. 1966. Lamprey control experiment in Canada. Annual Report for 1964. Great Lakes Fish. Comm. p.24-30.
- Furlong, P. 1986. Nipigon Bay assessment Program. OMNR files, Nipigon District
- German, M. J. 1968. Biological Survey of Nipigon Bay 1966-1967. The Ontario Water Resources Commission. 17p.
- Goodier, J. L. 1981. Native Lake Trout (*Salvelinus namaycush*) stocks in the Canadian waters of Lake Superior prior to 1955. M S. thesis, Univ. Toronto, Toronto, Ont. 194 p. + appendices and maps.
- _____. 1985. Exotic and hatchery raised fish of Canadian Lake Superior: through the years, species by species. 34p. unpubl. ms.
- Hamilton, J. G. 1987. Survey of critical fish habitat within International Joint Commission designated Areas of Concern, August-November, 1986. for OMNR. 117p. + appendices.
- Hamilton, S. and J. Brigham 1986. Rediscover Red Rock House. Pamphlet, Min. of Citizenship and Culture, Min. of North. Dev. and Mines. 12p.
- Harris, R. Cole, [ED.] 1987. Historical Atlas of Canada. Vol. 1. From the beginning to 1800. Univ. of Toronto Press.
- Hewitt, E. R. 1948. A trout and salmon fisherman for seventy-five years. Charles Scribner's Sons, New York. 33 p.
- Hogg, T. H. 1931. The Alexander Power Development on the Nipigon River. The Bulletin. May: 161-172. Hydro-Electric Power Commission of Ontario.

Hydro-Electric Power Commission of Ontario. 1926. The 18th annual report of the HEPC. p. 75-77.

_____. September 1943. Hydro Community at Cameron Falls. In Hydro News.

_____. 1949. The 42nd annual report of the HEPC p. 94.

_____. August 1950. Largest Nipigon Plant. In Hydro News.

_____. 1967. The report of the HEPC for the year 1966.

IJC/WQB1985. 1985 Report on Great Lakes Water Quality. Great Lakes Water Quality Board, IJC. Windsor, Ont.. 212 p.

Lake Nipigon Region Parkway Working Group 1987. Proposal for the establishment of a Lake Nipigon Region Parkway Authority. 4 p. + app.

Lawrie, A. H., and J. F. Rahrer. 1972. Lake Superior: effects of exploitation and introductions on the salmonid community. J. Fish. Res. Board Can. 29: 765-776.

Lein, L. M. May 3, 1972. Museum Musings. In The Nipigon Gazette, quoted in letter to Pat Furlong from Betty Brill, Nipigon Museum. 1987

_____. May 17, 1972. Museum Musings.

_____. July 5, 1972. Museum Musings.

_____. Nov. 15, 1972. Museum Musings.

_____. Feb. 14, 1973. Museum Musings.

_____. Sept. 19, 1973. Museum Musings.

_____. Dec. 12, 1973. Museum Musings.

_____. April 9, 1974. Museum Musings.

_____. Aug. 3, 1977. Museum Musings.

_____. Oct. 12, 1977. Museum Musings.

_____. May 28, 1980. Museum Musings.

Mac Beath, M 1924. Nipigon the sea without a shore. from Nipigon Bungalow Camp. A Canadian Pacific Publication. 16 p.

MacCallum W. R. and J. H. Selgeby. 1987. Lake Superior revisited 1984. Can. J. Fish. Aquat. Sci. 44 (Suppl. 2): 23-36.

Macdiarmid, F., B. A. Bensley, and C. A. Candee 1930. Report of Special Committee on the Game Fish Situation.. Sessional paper No. 54.

Millard, E. E. 1917. Days on the Nipigon. 104 p.

Mills, E. W. no date. Paddle, pack, and speckled trout. Tales of fishing in northern Ontario in the 1930's and 1940's. no publisher. 117 p.

Near, F. M. 1982. Nipigon River. History of development power and storage. Report No. 82579 File No. 143-50. Ontario Hydro.

- OMNR 1982. Northwestern Ontario Strategic Land Use Plan. 71p.
- _____. 1986. Seining. OMNR files, Nipigon District.
- _____. 1987. A summary of fisheries studies, Nipigon Bay, Lake Superior. OMNR files, Nipigon District.
- _____. 1988. Description: Nipigon River Report. Invitation to Tender.
- _____. 1989. Nipigon District Fisheries Management Plan:1989-2000. OMNR. In process
- Panel on TFM and Bayer 73. 1985. TFM and Bayer 73 lampricides in the aquatic environment. 184 p. Publ. No. NRCC 22488. Environmental Secretariat, Ottawa.
- Ryder R. A. 1957. A study of the yellow pickerel population in Lake Superior and the Nipigon River system, 1956. OMNR. unpubl.ms. 26p.
- _____. 1968. Dynamics and exploitation of mature walleyes, *Stizostedion vitreum vitreum*, in the Nipigon Bay region of Lake Superior. J. Fish. Res. Bd. Can. 25: 1347-1376.
- Scott, W. B. and E. J. Crossman. 1973. Freshwater fishes of Canada. Bull. Fish. Res. Bd. Can. 184: 966 p.
- Shraeder, H. A. 1983. Lake Nipigon Fisheries Management Plan. I. Background information: a review of the fishes and the fisheries of Lake Nipigon. OMNR. 184 p.
- Slack, H. W., 1887. Journey up the Nipigon River. From personal diary. 17 p.
- Steedman, R. J. and H. A. Regier. 1987. Ecosystem science for the Great Lakes: perspectives on degradative and rehabilitative transformations. Can. J. Fish. Aquat. Sci. 44 (Suppl. 2): 95-103.
- Tibbles, J. J. 1972. In Minutes Lake Superior Committee Annual Meeting. Great Lakes Fish. Comm. p.49-50.
- _____. 1982. Annual Report 1981. Sea Lamprey Control Centre. 116 p.
- Todd, J. 1977. The Nipigon Tramway. In Canadian Rail. no. 309: 293-312.
- Townes 1972. In Minutes of the District Advisory Committee Meeting. Nov. 25, 1972. OMNR files, Nipigon District.
- Waters, T. F. 1987. The Superior north shore. University of Minnesota Press, Minneapolis. p 243-260.
- Vander Wal, J., M. Kirby, S. Humphrey, and K. Cullis. 1989. Nipigon Bay Remedial Action Plan. Status Report. In process
- Voorhis, E. 1930. Historic forts and trading posts of the French regime and of the English fur trading companies. Natural Resources Intelligence Service, Department of the Interior. Ottawa. 188 p. + maps.

Whitcher, W. F. 1888. Nepigon (sic) trout, an Ottawa canoeist's experience on the northern shore of Lake Superior. Passenger Department, Canadian Pacific Railway, Montreal. 37 p.

TABLES, FIGURES, AND APPENDICES

Table 1. Fish species (n=31) collected in the lower Nipigon River, 1986- 1987.

Species	Latin Name	Source
Sea lamprey	<i>Petromyzon marinus</i>	1,4
Alewife	<i>Alosa pseudoharengus</i>	1,2,4
Pink Salmon	<i>Oncorhynchus gorbuscha</i>	5
Coho Salmon	<i>O. kisutch</i>	6
Chinook Salmon	<i>O. tshawytscha</i>	4,6
Rainbow trout	<i>O. mykiss</i>	1,2,3,4,5,6
Brook trout	<i>Salvelinus fontinalis</i>	1,4,5,6
Lake trout	<i>S. namaycush</i>	4,6
Lake whitefish	<i>Coregonus clupeaformis</i>	1,3,4,6,
Lake herring	<i>Coregonus artedii</i>	3
Round whitefish	<i>Prosopium cylindraceum</i>	1,2,4
Rainbow smelt	<i>Osmerus mordax</i>	1,2,3,4
Northern pike	<i>Esox lucius</i>	3
Longnose sucker	<i>Catostomus catostomus</i>	1,3,4
White sucker	<i>C. commersoni</i>	1,2,3,4
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	4
Lake chub	<i>Couesuis plumbeus</i>	1,4
Carp	<i>Cyprinus carpio</i>	1
Emerald shiner	<i>Notropis atherinoides</i>	1,4
Spottail shiner	<i>N. hudsonius</i>	1,4
Burbot	<i>Lota lota</i>	1,3,4
Brook stickleback	<i>Culaea inconstans</i>	1,4
Ninespine stickleback	<i>Pungitius pungitius</i>	4
Trout-perch	<i>Percopsis omiscomaycus</i>	1,2,4
Yellow Perch	<i>Perca flavescens</i>	1,2,3,4
Walleye	<i>Stizostedion vitreum</i>	3,5,6
Least darter	<i>Etheostoma microperca</i>	4
Johnny darter	<i>E. nigrum</i>	4
Logperch	<i>Percina caprodes</i>	4
Mottled sculpin	<i>Cottus bairdi</i>	1,4
Slimy sculpin	<i>C. cognatus</i>	1,4

1 Hamilton 1986; 2 OMNR 1986; 3 Furlong 1986; 4 Dalziel 1987;
5 Creel Survey 1987; 6 Creel Survey 1988

Table 2a. Creel Survey summary: lower Nipigon River, July 21 - Nov. 1, 1988. (from OMNR files, Nipigon Districts)

Species	CPUE	Effort (hr)	Total Estimated Harvest (numbers of fish)
Coho Salmon	0.084	117	10
Chinook Salmon	0.094	1779	173
Rainbow trout	0.146	3731	552
Brook trout	0.051	2024	135
Lake trout	0.355	224	133
Lake whitefish	1.762	86	170
Walleye	0.154	32	5

Table 2b. Creel survey summary: Pine Portage, July 21 - Sept.15, 1988. (from OMNR files, Nipigon District)

Species	CPUE	Effort (hr)	Total Estimated Harvest (numbers of fish)
Brook trout	0.038	887	33
Lake whitefish	0.123	94	25

Table 2c. Creel survey summary: lower Nipigon River, Sept. 1 - Nov. 1, 1987. (from OMNR files, Nipigon District)

Species	CPUE
Pink Salmon	0.03
Chinook Salmon	0.00
Rainbow trout	0.06
Brook trout	0.03
Walleye	0.01

Table 3. Revenues from sales of sport-fishing permits on the Nipigon River system; 1900-1915. (from Anon. 1901-1916)

Year	Revenues
1900	1040
1901	940
1902	1095
1903	1080
1904	1075
1905	1375
1906	1595
1907	1200
1908	895
1909	983
1910	974
1911	not reported
1912	1070
1913	1155
1914	1005
1915	957
average:	1096

Table 4. Settlement patterns and approximate populations along the Nipigon River.

	1920	1930	1940	1950	1960	1970	1980
Pine Portage				Pop 1300 ¹ (1948 - 1950)			
Cameron Falls	4 families ² (1920)		150 ³ (1943)			90 - 100 ³ (1972)	closed (1972)
Parmachene		approx. 15 families ⁴ (1930 - 40)	?.....				
Lake Helen			?.....	10 houses ⁵ (1950)		Pop. 157 ²	
Log Drive Camps	 (1923)		approx. pop 75-80 ⁶			closed (1973)	
Nipigon		Pop.953 ⁷ (1933) (incl. Red Rock)		1897 ⁷ (1950)		2315 ⁷ (current)	

¹ HEPC 1950; ² HEPC 1943; ³ Douglas, pers. comm.; ⁴ Wawia, B. pers. comm.; ⁵ Wawia, M. pers. comm.; ⁶ Hill, pers. comm.; ⁷ Wheeler, pers. comm.

Table 5. Chronology of hydro-electric development of the Nipigon River. (adapted from Near 1982.)

Year	Development
1920	Cameron Falls; dam and generating station, 4 units
1926	Cameron Falls Extension (Units #5 & 6)
1926	Virgin Falls Storage Dam
1930	Alexander; dam and generating station, 3 units
1945	Alexander Extension (Unit #4)
1950	Pine Portage; dam and generating station, 2 units
1950(?)	Virgin Falls Dam partially removed
1954	Pine Portage Extension (Units #3 & 4)
1958	Cameron Falls Extension (Units #7)
1958	Alexander Extension (Unit #5)

Table 6. Stocking data: Nipigon River, 1921 - 1988. (from OMNR files, Nipigon District)

Location	Species	Year	Quantity	Age
Nipigon River (location unspecified)	speckled trout	1921	20, 000	fry & fingerlings
	speckled trout	1922	27, 500	fry & fingerlings
	speckled trout	1923	200, 000	fry & fingerlings
	speckled trout	1924	85, 000	fry & fingerlings
	speckled trout	1925	40, 000	fry & fingerlings
	speckled trout	1925	149, 400	fry & fingerlings
	speckled trout	1927	30, 000	fry & fingerlings
	speckled trout	1928	65, 000	fry & fingerlings
	speckled trout	1931	110, 000	fingerlings
	speckled trout	1923	250, 000	
	speckled trout	1923	21, 267	yearlings
	speckled trout	1934	400, 000	
	speckled trout	1935	164, 000	fry & fingerlings
	speckled trout	1936	56, 800	fry & fingerlings
	speckled trout	1938	18, 000	fry & fingerlings
	speckled trout	1939	58, 400	
	speckled trout	1939	240	adults
	speckled trout	1940	55, 600	
Frazer Creek	speckled trout	1924	20, 000	fingerlings
	speckled trout	1928	25, 000	fry & fingerlings
	speckled trout	1923	73, 000	
	speckled trout	1939	6, 000	
Lake Helen	salmon trout	1924	20, 000	fry
	salmon trout	1926	25, 000	fry & fingerlings
	whitefish	1925	1, 000, 000	
	whitefish	1925	1, 000, 000	fry
1940 - 1945 inclusive. Data not available.				
Alexander Falls	brook trout	1951	4, 000	M12
	brook trout	1955	6, 000	M12
	brook trout	1960	50	M36
	brook trout	1984	302, 460	eyed-egg
	brook trout	1984	663	M60
	brook trout	1987	9, 000	M04
	arctic grayling	1959	900	M12
Cameron Falls	brook trout	1950	3, 000	M12
	brook trout	1950	1, 200	M36
	brook trout	1951	4, 000	M12
	brook trout	1953	4, 000	M06

Table 6. (continued)

Location	Species	Year	Quantity	Age
Cameron Falls (continued)	brook trout	1956	1, 500	M12
	brook trout	1960	50	M40
	brook trout	1974	5, 000	
	lake trout	1950	15, 000	M16
	arctic grayling	1959	90	M12
Pine Portage	brook trout	1950	3, 000	M12
	brook trout	1950	36, 000	M06
	brook trout	1950	1, 200	M36
	brook trout	1953	2, 000	M12
	brook trout	1953	4, 000	M06
	brook trout	1974	5, 500	
	brook trout	1982	32, 300	eyed-egg
	brook trout	1983	34, 500	M04
	lake trout	1950	15, 000	M12
Jessie Lake	brook trout	1982	1, 138	M36
	brook trout	1983	500	M16
	brook trout	1984	1, 579	M35
	lake trout	1955	5, 000	M06
	lake trout	1968	5, 000	M12
	lake trout	1969	4, 000	M12
	lake trout	1970	2, 500	M12
	lake trout	1973	2, 500	M16
	lake trout	1971	14, 500	
	lake trout	1975	14, 500	
	lake trout	1976	14, 500	
	lake trout	1987	224, 125	eyed-egg
Nipigon River (below Lake Helen)	lake trout	1982	40	M71(adult)
	lake trout	1984	3, 050	M09
	lake trout	1985	3, 010	M12
	lake trout	1985	33, 600	M11
	lake trout	1986	28, 800	M11
	lake trout	1987	0	
	lake trout	1988	0	
	walleye	1983	650, 000	fertile egg
	walleye	1985	1, 623	fingerlings
	walleye	1986	187	adult
	walleye	1987	0	
	walleye	1988	48	adult

Table 7. Species composition of test netting, Nipigon River.

Species	Seine Net (OMNR 1986)	Trapnet at Lagoon (Furlong 1986)	Gillnet in Lake Helen (OMNR 1987)
Alewife	1	-	-
Rainbow trout	7	2	-
Lake trout	-	-	1
Lake whitefish	-	18	20
Round whitefish	1	-	18
Lake herring	-	1	-
Rainbow smelt	11	1	13
Northern pike	-	2	1
Longnose sucker	-	61	40
White sucker	9	284	39
Shiners*	49	-	-
Burbot	-	1	-
Stickleback*	2	-	-
Trout-perch	77	-	-
Yellow perch	23	933	43
Walleye	-	1	10
TOTAL	180	1304	185

* species not specified.

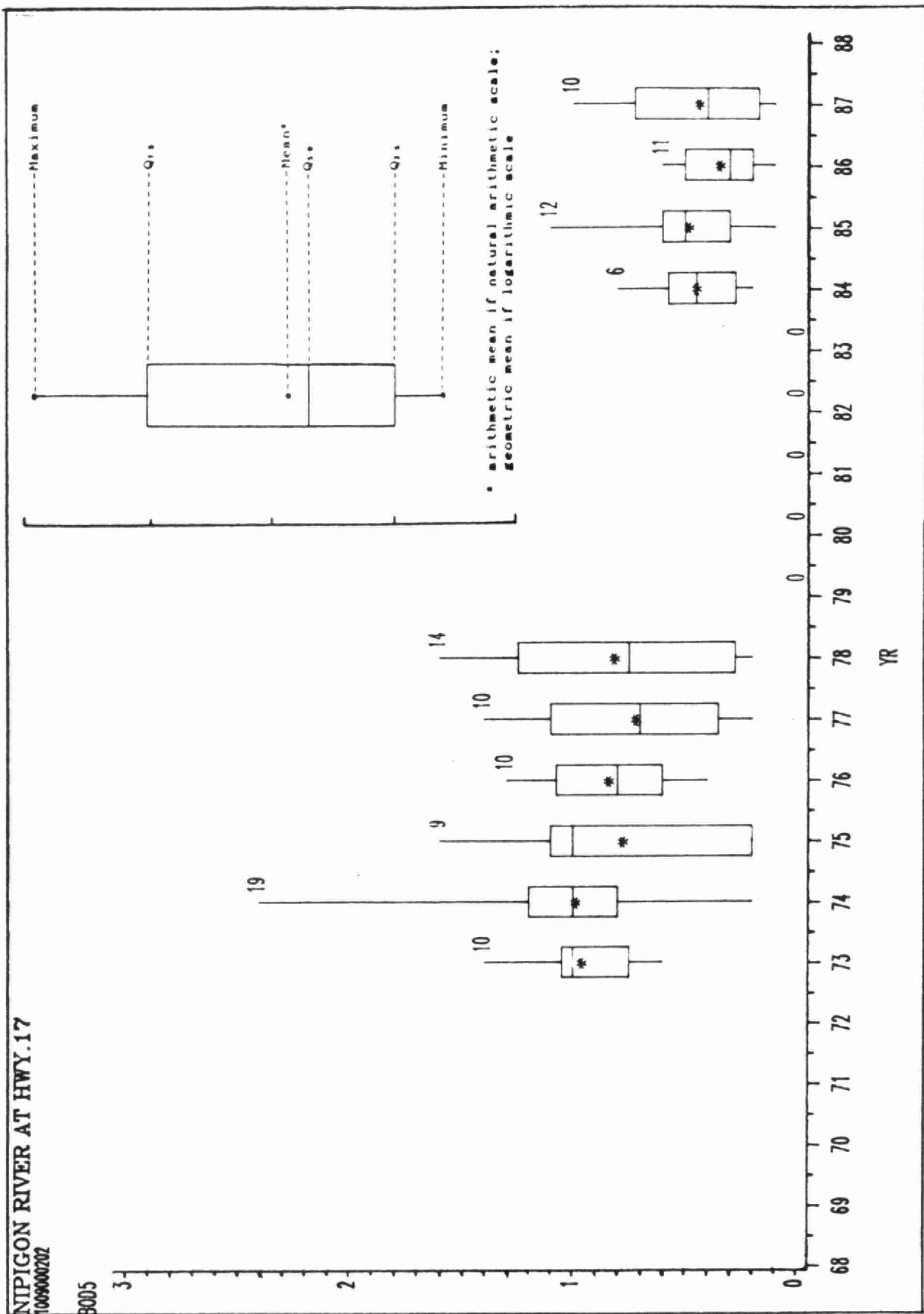


Figure 2. Biological Oxygen Demand:OMOE data base for Nipigon River from OMOE files NW Region.

NIPIGON RIVER AT HWY. 17

0009000702

ppb

0.22

0.21

0.20

0.19

0.18

0.17

0.16

0.15

0.14

0.13

0.12

0.11

0.10

0.09

0.08

0.07

0.06

0.05

0.04

0.03

0.02

0.01

0.00

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16

9

Figure 3. Phosphorous, unfiltered total: OMOE data base for Nipigon River from OMOE files NW Region.

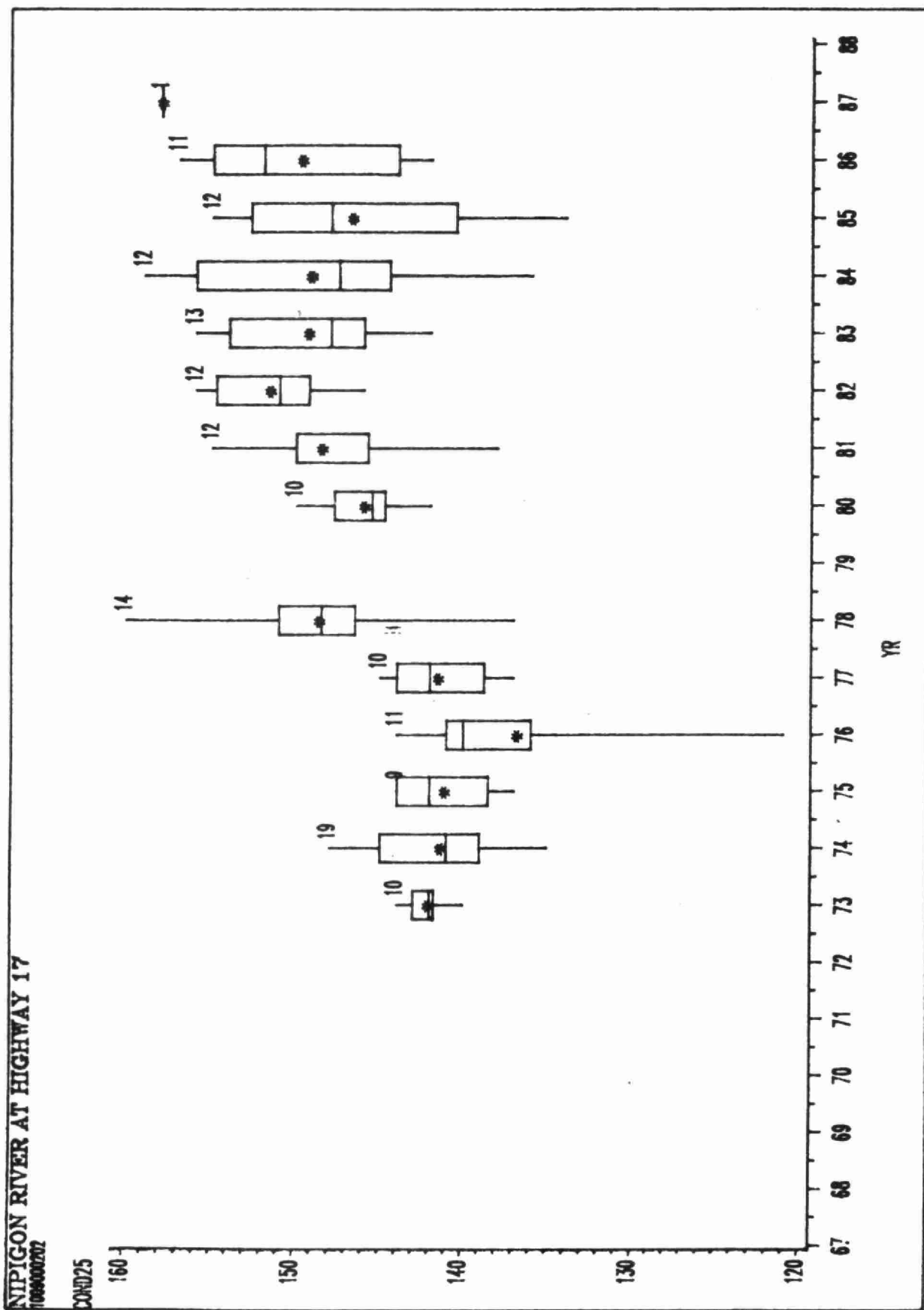


Figure 4. Conductivity OMOE data base for Nipigon River from OMOE files NW Region.

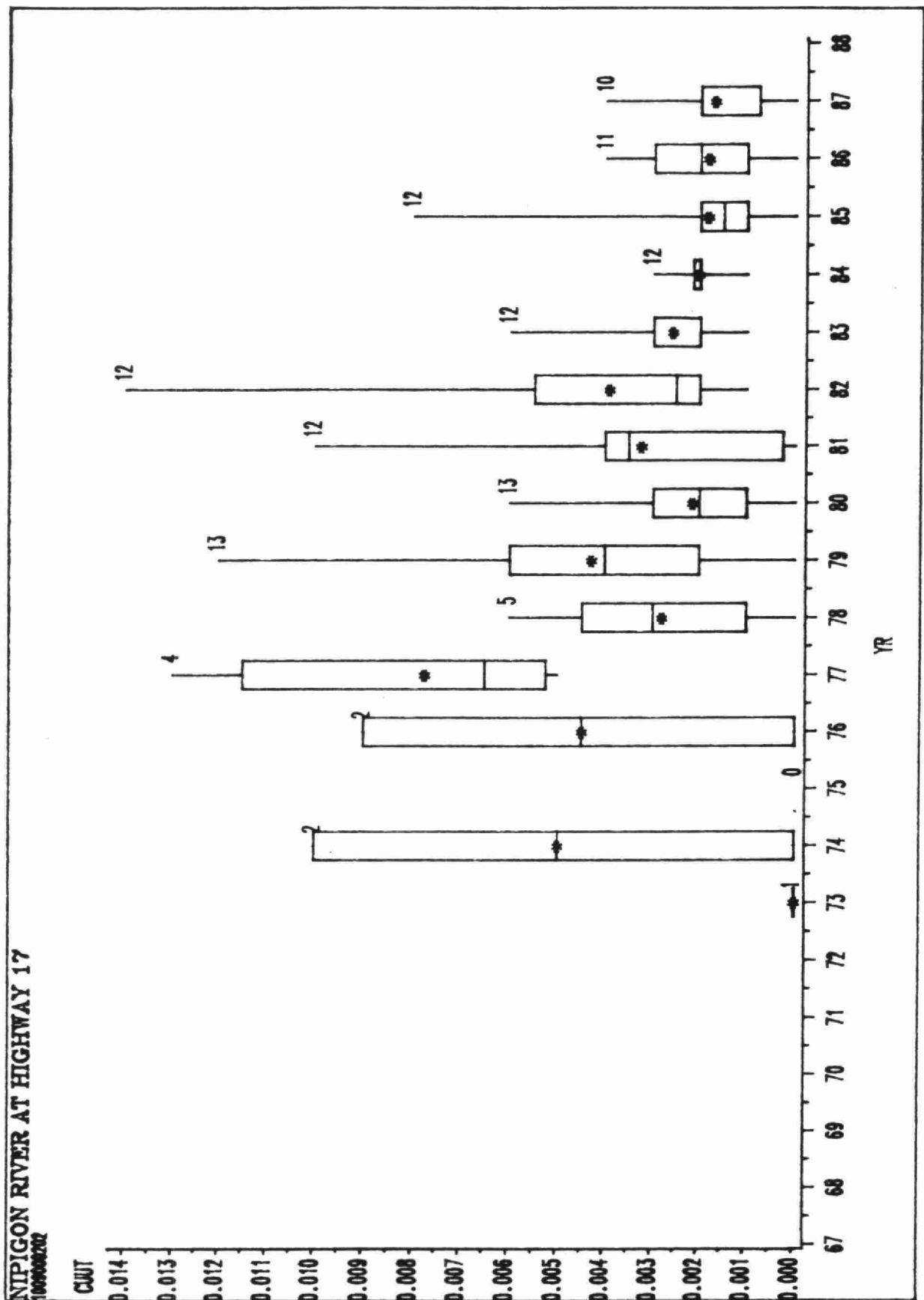


Figure 5. Copper unfiltered total:OMOE data base for Nipigon River from OMOE files NW Region.

NIPIGON RIVER AT HIGHWAY 17

1005000702

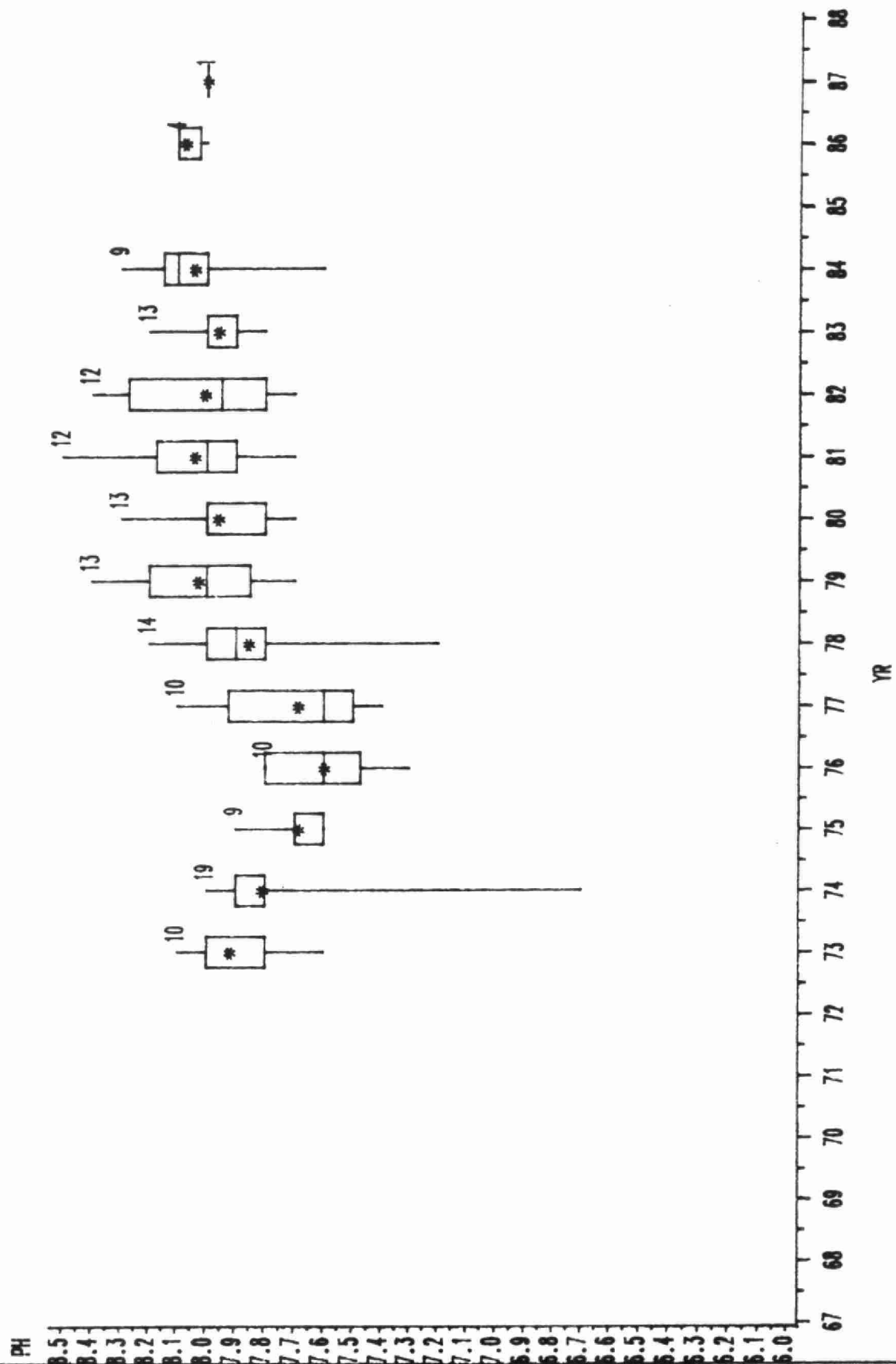


Figure 6. pH: OMOE data base for Nipigon River from OMOE files NW Region.

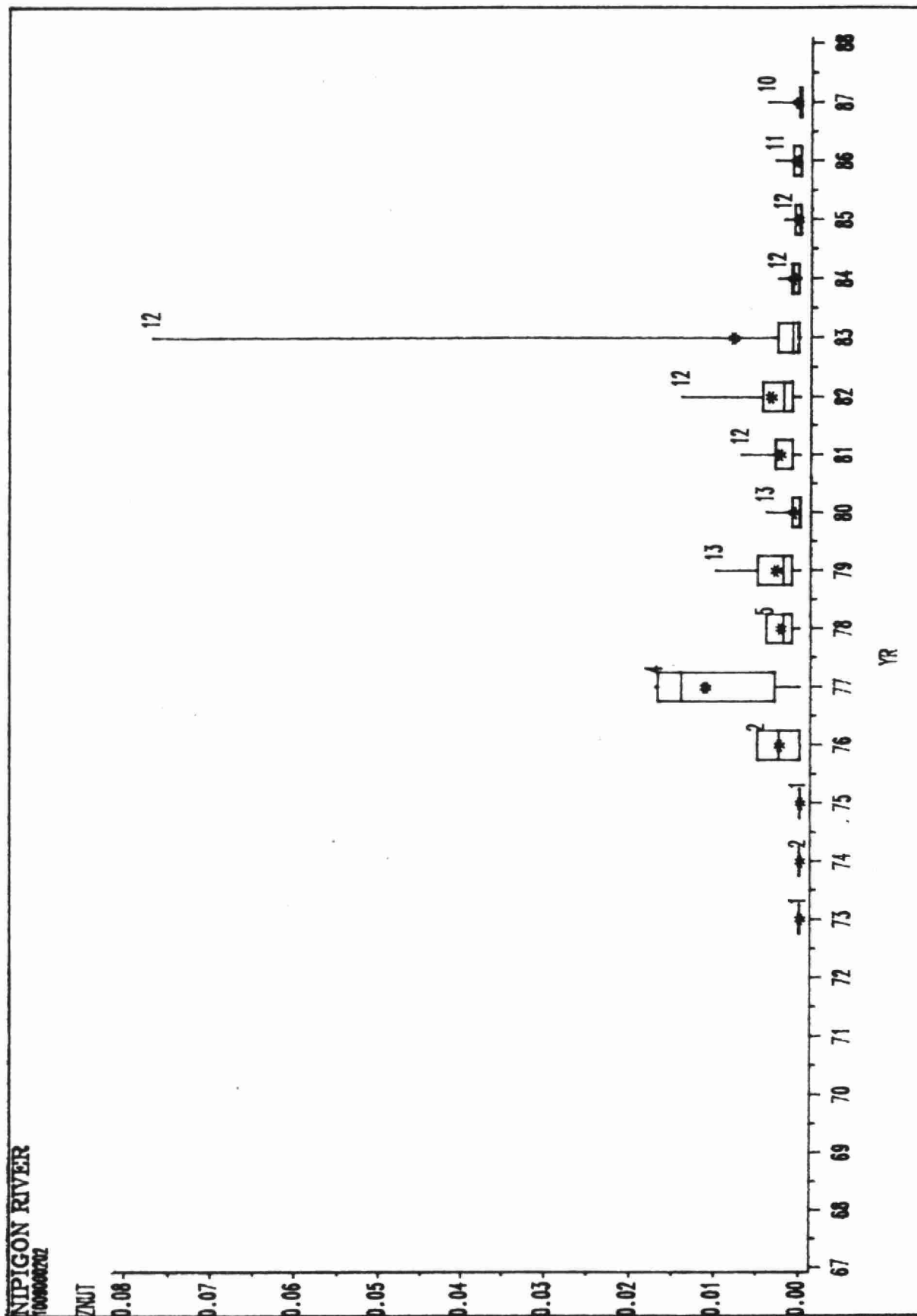


Figure 7. Zinc unfiltered total: OMOE data base for Nipigon River from OMOE files NW Region.

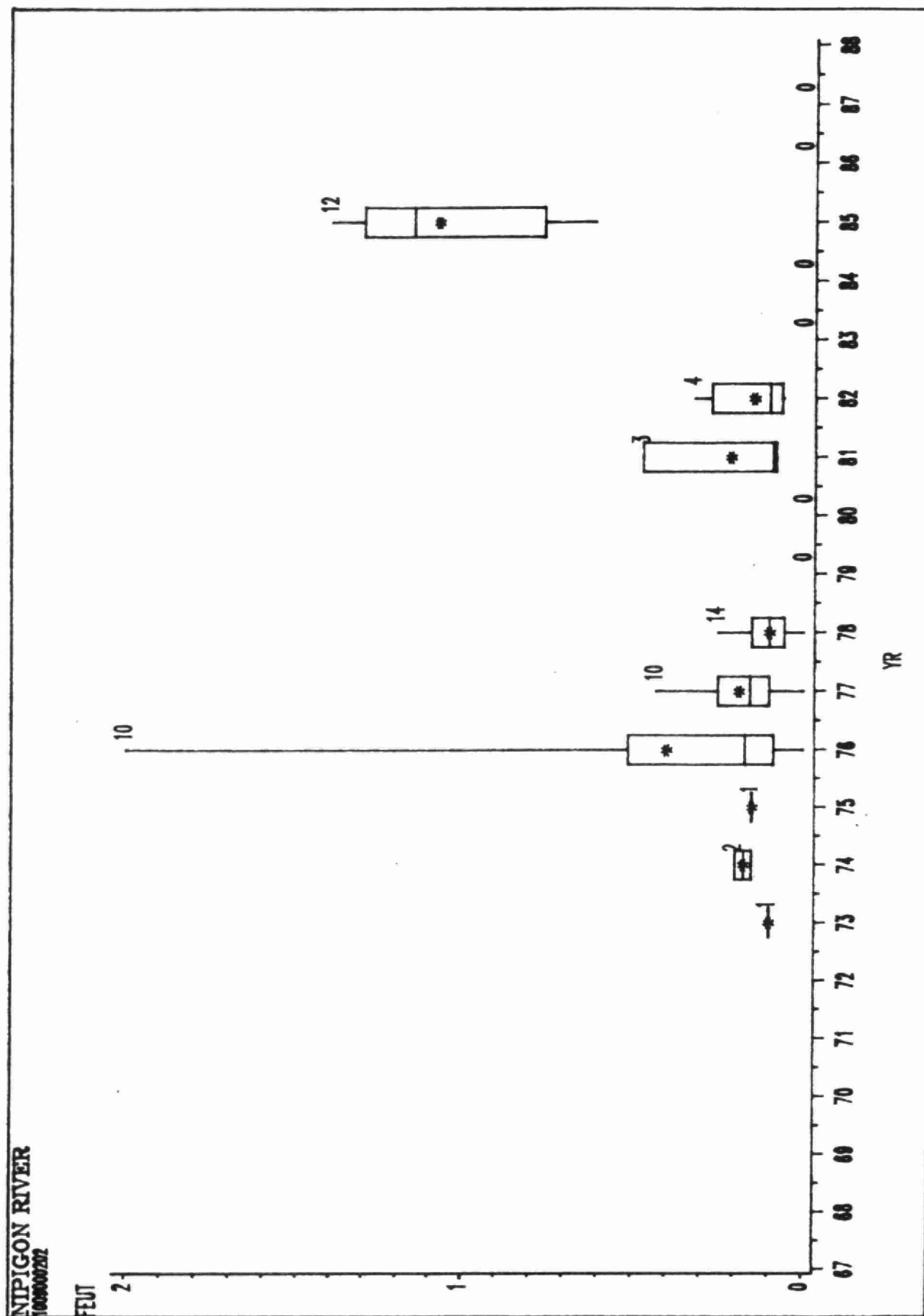


Figure 8. Iron unfiltered total: OMOE data base for Nipigon River from OMOE files NW Region

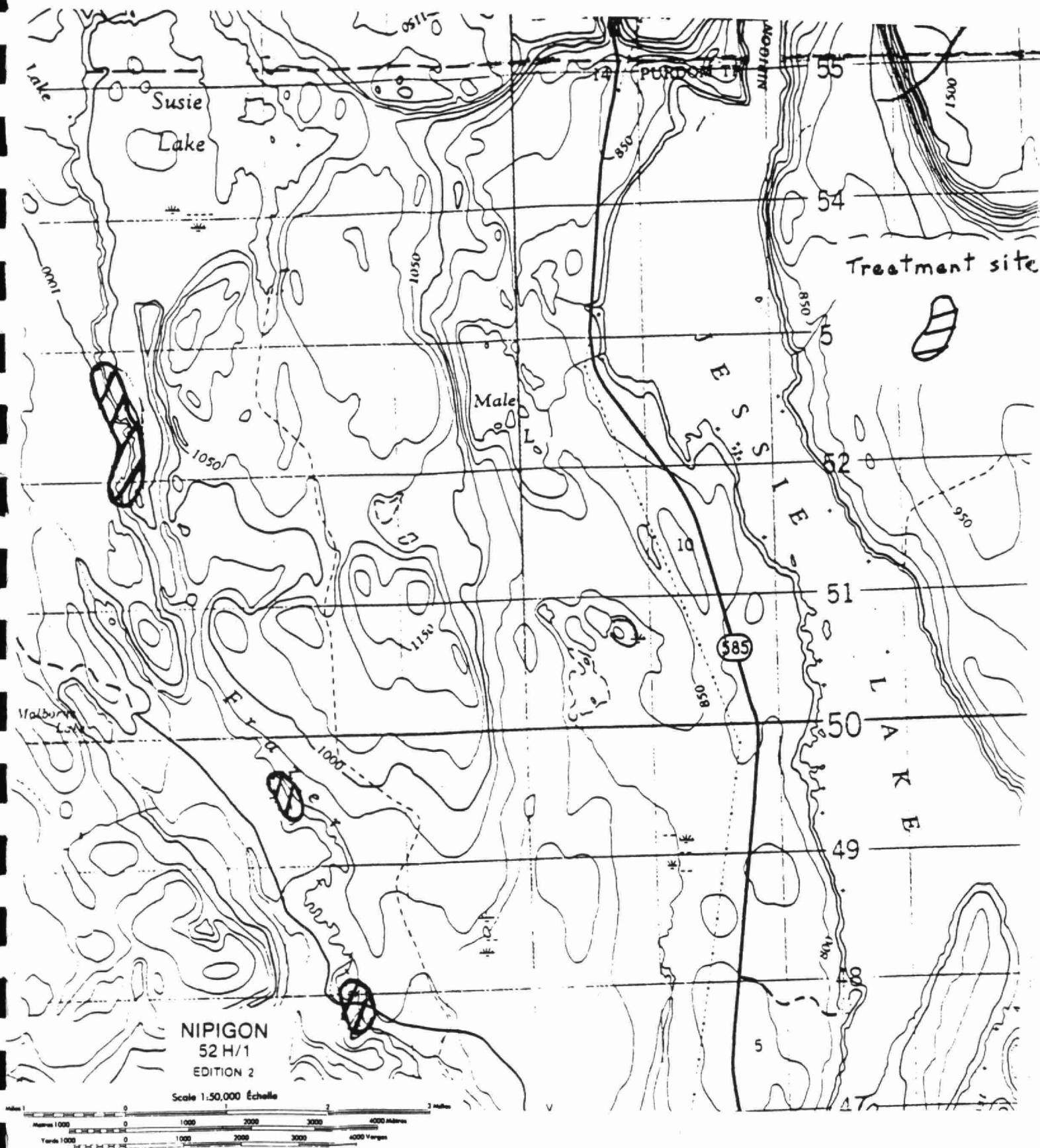


Figure 9. Locations of DDT treatment sites during 1950s on Frazer Creek.
from Douglas.B.Ontario Hydro. Thunder Bay pers. comm.

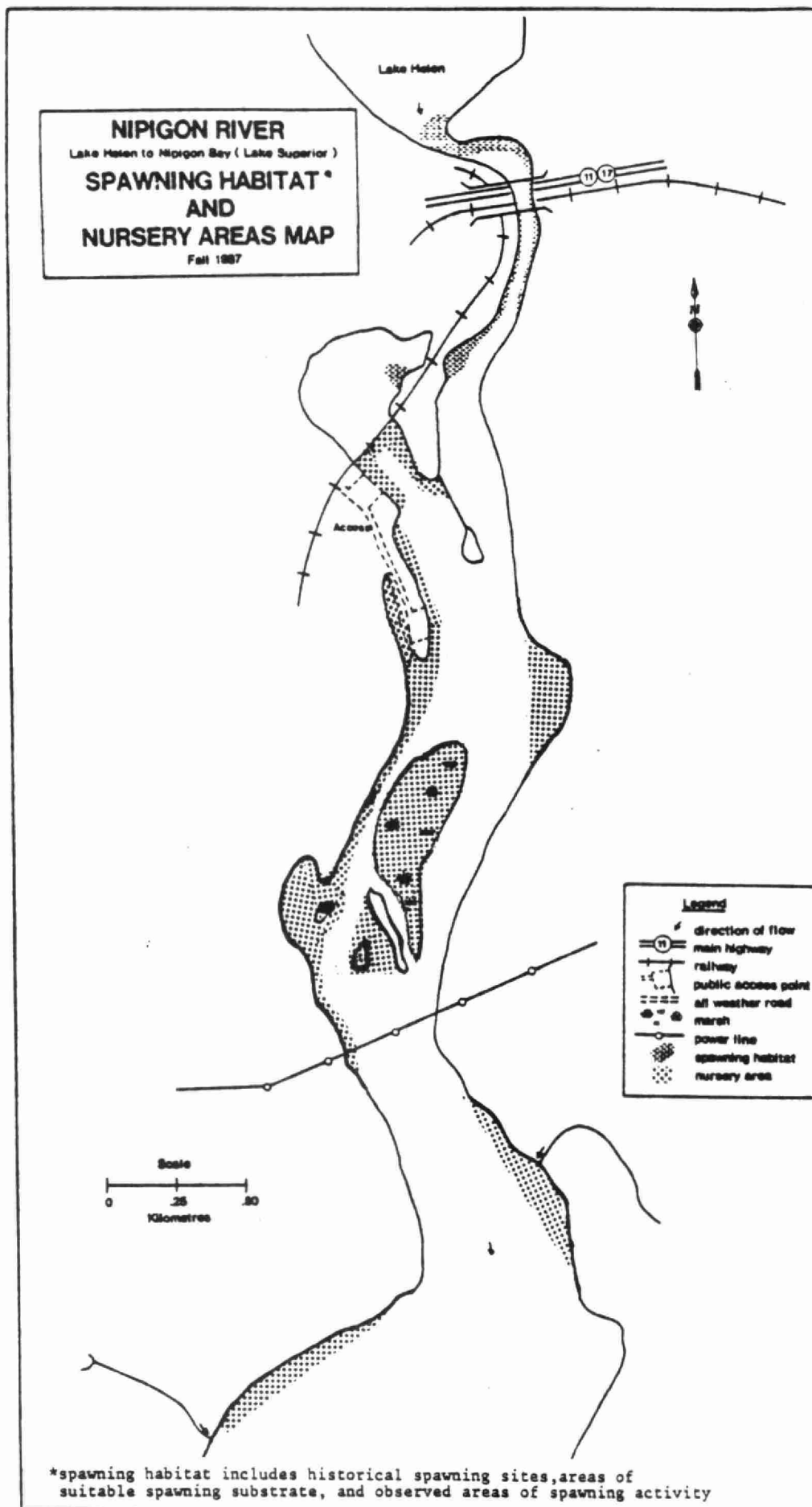


Figure 10. Map of aquatic habitat inventory below Lake Helen. from OMNR files. Nipigon District.

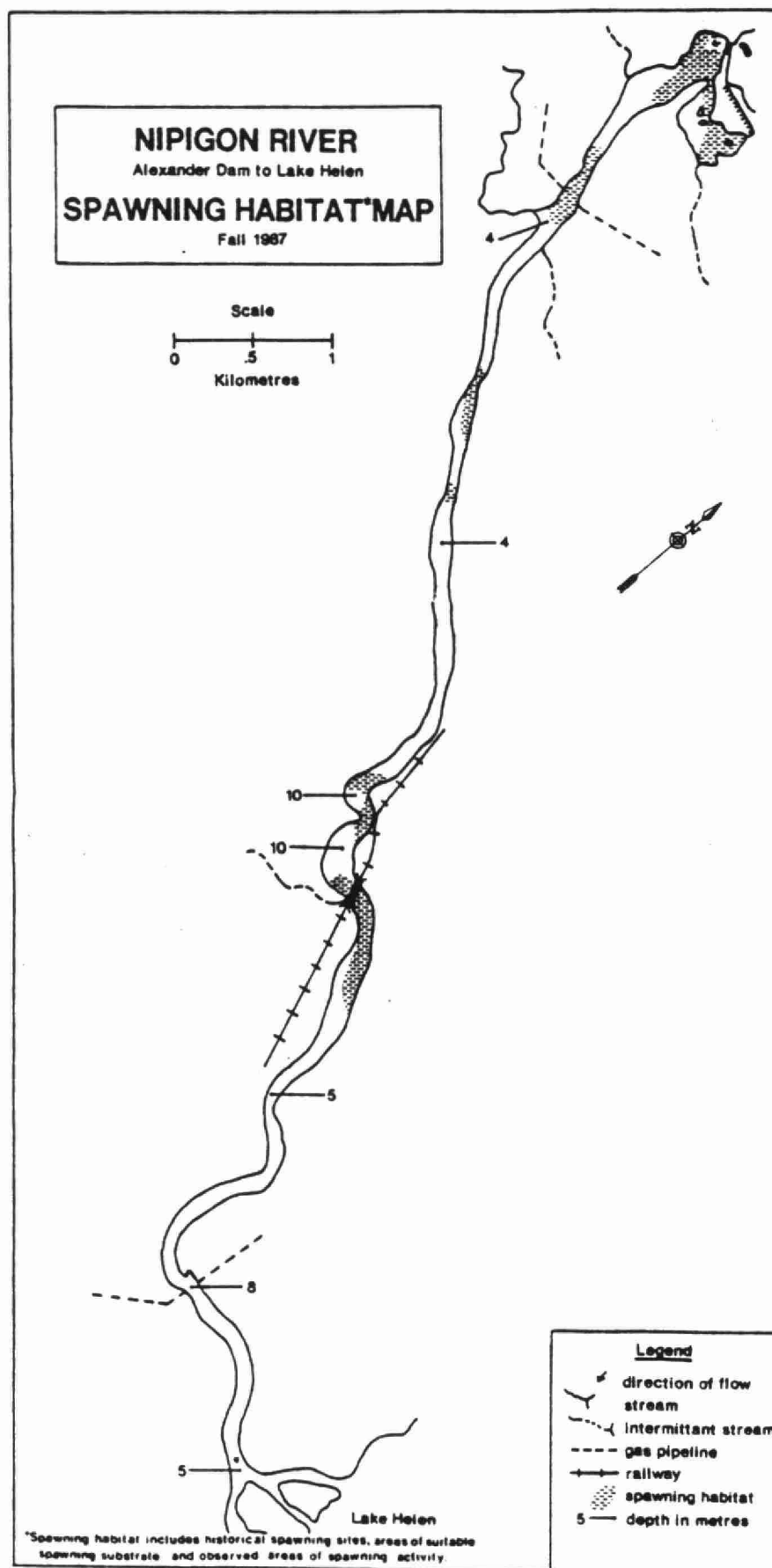


Figure 11. Map of spawning habitat inventory between Alexander Falls and Lake Helen. from OMNR files. Nipigon District.

Appendix 1. Specimen of letter to person to be interviewed

253 N. Algoma St.
Thunder Bay, Ontario
P7A 5A5
telephone 807-345-0328
Dec. 27, 1988

M-----
P.O. Box
Nipigon, Ontario
P0T 2J0

Dear M-----:

As I mentioned in my telephone call on December 10, I am working on a report on the fisheries of the Nipigon River for the Nipigon District Office of the Ministry of Natural Resources. I have been asked to pull together anything I can find on what the river and its fisheries were like in the past, what uses people made of them, and on the changes that have taken place in the fisheries, fish habitat, and in the way the fisheries have been used (for example: subsistence, guiding, etc.). I am interested in talking to you not only about your personal experience on the river, but also about ... use of the river has changed through the years. While I am especially interested in the river itself, information on Lake Helen (or on Nipigon Bay) will also be useful.

I plan on being in Nipigon on Wednesday, January 4. I look forward to meeting you then; perhaps we can meet after lunch. I will call when I get into town.

Until then, Happy New Year.

Sincerely,

Mary Ellen MacCallum

Appendix 2. Summary of introductions of new fish species to the Nipigon River system, or contiguous waters.

Rainbow trout:

stocked at Port Arthur in 1894 and 1899 (Goodier, 1985)

Atlantic salmon:

spawned at Camp Alexander in 1915 from a 1912 planting (Goodier, Ibid.).

Smelt:

were established on the river by the mid 1950s (Ryder pers. comm.).

Arctic grayling:

stocked at Alexander Falls and Cameron Falls in 1959, with no reported success (OMNR files, Nipigon District).

Sea lamprey:

first recorded in the Nipigon River in 1963 (Fisheries Research Board, 1964).

Pink salmon:

introduced at Port Arthur in 1956(cited in Goodier Ibid.); first caught in the river in 1961 (Smutylo pers. comm.).

Chinook salmon:

first caught in Nipigon Bay in 1974; cited by Goodier (Ibid.) as first identified in the Nipigon River below Scott Falls(?) in 1979. (This location is unknown to OMNR district staff and local residents. There is a Scott Falls on the Michipicoten River. Chinook appeared on that river before the Nipigon.)

Coho:

stocked in the Jackpine and Gravel Rivers, 1969-1971 (Lawrie 1978 cited in Goodier Ibid.).

Brown trout:

one caught in 1974 (Smutylo pers. comm.); in American waters plantings had taken place about 1883, and somewhere in Ontario waters, in 1955 (Goodier Ibid.).

Appendix 3. OFAH - Molson Export Big Fish Contest: live release category.
 Entries of Nipigon River brook trout from the top 15 entries. (from OMNR file, Nipigon District)

Year	Girth (in)	Length (in)
1987	13.5	21.25
1987	11.5	18.0
1987	10.0	20.5
1987	10.62	19.0
1986	16.0	25.0
1986	14.5	23.75
1986	13.75	22.25
1986	13.5	22.0
1986	13.25	21.75
1986	12.0	21.5
1986	12.0	20.5
1986	11.0	18.75
1986	10.75	18.5
1985	14.0	23.0
1985	14.0	23.0
1985	11.0	22.5
1985	13.25	22.25
1985	13.25	20.75
1985	13.0	21.0
1985	12.5	21.0
1985	11.0	19.0

Appendix 4. OFAH - Molson Export Big Fish Contest: catch and keep category. Entries of Nipigon River brook trout from the top 15 entries. (from OMNR files, Nipigon District)

Year	Weight		Year	Weight	
	lb	oz		lb	oz
1987	no entries		1977	7	5
1986	6	12	1977	6	9
1985	8	5	1976	8	2
1985	7	15	1976	6	7
1984	7	4	1975	6	15
1983	6	9	1975	5	15
1982	9	0	1974	6	9
1982	7	7	1973	7	5
1981	7	14	1973	6	12
1981	6	1	1973	5	11
1980	8	6	1972	6	12
1980	7	15	1972	6	0
1980	7	14	1972	4	8
1980	7	3	1971	6	15
1980	6	6	1971	6	8
1980	6	1	1971	5	5
1979	7	13	1970	no entries	
1979	7	12	1969	5	13
1979	7	10	1968	6	8
1979	7	5	1968	6	8
1979	7	4	1968	5	15
1979	6	8	1967	7	4
1978	8	7	1966	7	2
1978	7	6	1965	5	11
1978	7	6	1962	6	15
1978	7	3	1962	6	8
1978	6	8	1962	5	5
1977	7	9			

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM		TEST-NAME:	FWFLOW	TCMF	ECIGMF	ECMPN	FCMF	PSAMF	BOD5	RST	RSP	PPUT
			COLIFORM	ESCHERIC		FECAL	PSEUDOMN	BOD				PHOSPHOR
			TOTAL	HIA COLI		COLIFORM	AERUG.	5 DAY				UNF.TOT.
			MF	MF--IG		MF	MF	TOT.DEM.		RESIDUE	RESIDUE	MG/L
			CNT	CNT	E.COLI	CNT	CNT	MG/L	TOTAL	PARTIC.	MG/L	AS P
			/100ML	/100ML	1=FOUND	/100ML	/100ML	AS O	MG/L	MG/L	MG/L	AS P
SAMPLE	DATE	TIME	NUMBER	FLOW	M3	/S						
YYMMDD	LMT											
730606	0950		21009	319.982			8		1.0	110	15	0.011
730626	1130		21032	300.160			3000		1.0	100	3	0.015
730719	0930		21055	345.467			190		1.0	95	3	0.020
730809	0900		21078	291.665			80		1.4	75	3	
730829	0930		21101	334.141			2400		1.2	110	3	0.014
730918	0830		21124	359.626			180		0.6	75	5	0.007
731009	1115		21147	279.772			210		0.8	120	3	0.009
731030	1100		21170	243.243			84		0.6	100	1	0.012
731120	1100		21193	233.615			20		1.0	100	1	0.010
731211	0945		21212	175.565			16		1.0	100	3	0.009
740108	1135		34013				12		0.8	95	1	0.023
740129	1130		34044				1		0.2	95	1	0.007
740219	1055		34075				1		1.2	90	2	0.009
740312	1130		34106				4		2.4		1	0.036
740402	1140		34137				4		1.0		1	
740416	0945		34168				1		1.2		1	
740423	1330		34199				40		0.6		5	0.013
740507	1050		34261				4		0.6		5	0.017
740514	1130		34292				4		1.2		10	
740530	1100		34230				24		1.0		10	0.016
740604	1000		34323				56		0.2		5	0.010
740626	0745		34354				440		1.4	130		0.009
740717	0830		34385				120		0.8		2	0.009
740807	1600		34416				670		1.6		3	0.011
740902	1445		34447				710		1.2		2	0.007
740930	1340		34478				290		0.8		2	0.005
741023	1515		34509				264		0.8		15	0.006
741118	1115		34543				48		0.8		1	0.030
741209	1230		34573				24		1.0		3	0.007
750113	1200		33017	419.092			48		0.2		2	0.005
750210	1340		33048	436.082			4		1.2		1	
750310	1245		33079	450.240			1		0.6		1	0.003
750402	1315		33110	430.418			10<		1.6		1	0.025
750408	1315		33141	458.735			4		1.0		2	0.003
750415	1240		33172	433.250			4		0.2		2	0.007
750422	1600		33203	447.409			1		1.0		1	0.013
750506	1330		33234	447.409			44		1.0		2	
750604	1000		33265	410.597			1		0.2		5	0.010
760302	1300		10046						0.6			0.006
760322	1100		10067				1		0.8	92.00	2.00	0.005
760421	0900		10112				12		0.6		10.00	0.012

(CONT'D)

Appendix 5. OMOE water quality data from the Nipigon River station
from OMOE files NW Region.

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77 U T M: 16 0408550.0 5430200.0 4 REGION: 06

DISTANCE: 9.656

*INTERIM TEST-NAME:			FWFLOW	TCMF	ECIGMF	ECMPN	FCMF	PSAMF	BOD5	RST	RSP	PPUT
			STREAM	COLIFORM	ESCHERIC		FECAL	PSEUDOMN	BOD			
			FLOW	TOTAL	HIA COLI		COLIFORM	AERUG.	5 DAY	RESIDUE	RESIDUE	PHOSPHOR
			M3	MF	MF--IG	E.COLI	MF	MF	TOT.DEM.	TOTAL	PARTIC.	UNF.TOT.
			/S	CNT	CNT	BY MPN	CNT	CNT	MG/L	MG/L	MG/L	MG/L
SAMPLE	DATE	HOURL	SAMPLE						AS 0			AS P
YHMD	DD	LMT	NUMBER									
760426	1020		10122	8			8		0.8		110.00	0.069
760518	1025		10177	1			1		0.8		35.00	0.022
760621	1115		10224	8			1		1.3	95.00	5.00	0.014
760713			10239	4			1		1.3		5	0.037
760810	0900		10285	4			1		0.4		2	0.007
760921	1200		10327	24			1		0.8	101.00	10.00	0.010
761122	1115		10389	16			1		1.0		10.00	0.011
761214	1530		10423	4			1				1.0	0.006
770118	1400		15014	1			1		1.0		2.0	0.009
770222	1300		15048	1			1		1.4		2.0	0.010
770321	0920		15080	1			1		0.2		1.0	0.008
770419	2000		15110	8			4		0.2		10.0	0.012
770426	2000		15128	20			1		0.8		15.0	0.016
770531	1140		15163	4			1		0.4		3.0	0.009
770627	1430		15212	4			1		0.4		5.0	
770712	1400		15228	48			1		1.4		3.0	0.003
770823	1545		15292	12			1		0.6		2	0.006
770927	2115		15332	48			16		0.8		10.0	0.012
780104	1355		20505	4<			4<		1.4		3.0	0.003
780207	1510		20519	4<			4<		0.2		2.0	0.003
780307	1500		20536	4<			2<		0.2		1.0	0.004
780404	1500		20553	4<			4<		1.6		1.0	0.007
780501	0952		20570	16			4<		0.7		3.0	0.020
780509	1150		20587	4<			4<		0.3		5.0	0.016
780605	1015		20598	4<			4<		1.0	100.0	5.0	0.018
780703	0947		20613	8			4<		1.6	100.0	5.0	0.006
780807	1030		20630	4<			4<		1.2	110.0	5.0	0.016
780905	1020		20646	4<			4<		0.2	85.0	3.0	0.012
781002	1045		20655	152			108		0.6	80.0	2.0	0.011
781030	1045		20670	4			4<		1.0	85.0	2.0	0.013
781205	1205		20687	4<			4<		0.6	90.0	2.0	0.004
	1240		20700	4<			4<		0.8	90.00	1.00	0.010
790104	1100		30505				4<				1.00	0.002
790205	1035		30519	4<			4<				2.00	0.008
790305	1200		30532	4<			4<				2.00	0.005
790403	1230		30550	4<			4<				1.00	0.003
790502	1200		30553								5.00	0.015
790508	1140		30566								10.00	0.008
790607	1330		30572	4			4<				3.00	0.016
790704	1308		30585	52			4<				15.00	0.023
790808	1235		30598	156			4<				5.00	0.008

Appendix 5. (cont'd)

(C O N T D)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM TEST-NAME:		FWFLOW	TCMF	ECIGMF	ECMPN	FCMF	PSAMF	BOD5	RST	RSP	PPUT
		STREAM	COLIFORM	ESCHERIC		FECAL	PSEUDOMN	BOD			
		FLOW	TOTAL	HIA COLI		COLIFORM	AERUG.	5 DAY			
SAMPLE		MF	MF	MF--IG	E.COLI	MF	MF	TOT.DEM.	RESIDUE	RESIDUE	PHOSPHOR
DATE	HOOR	CNT	CNT	CNT	BY MPN	CNT	CNT	MG/L	TOTAL	PARTIC.	UNF.TOT.
YYMMDD	LMT	/S	/100ML	/100ML	1=FOUND	/100ML	/100ML	AS O	MG/L	MG/L	MG/L
SAMPLE											AS P
NUMBER											
790905	1040	30611	88			4<				3.00<	0.008
791001	1230	30628	170			8				3.00	0.012
791106	1215	30637	20			4<				5.00	0.001<
791203	1050	30651	4			4<				10.00	0.010
800108	1700	10501	4<			4<				3.00	0.006
800129	1010	10514	4<			4<				1.00	0.002
800226	1130	10528	4<			4<				1.00	0.002
800317	1130	10542	4<			4<				1.00	0.002
800428	1115	10556	4<			4<				5.00	0.007
800506	1255	10570	4			4<				55.00	0.044
800527	1040	10578	16			4<				3.00	0.002
800624	1425	10592	8			4<				3.00	0.010
800728	1255	10607	92			4				4	0.002
800826	1430	10622	52			36				5.00	0.005
800930	1025	10637	24			4				4.00	0.007
801027	1240	10652	32			4<				30.00	0.020
801125	1120	10667	8			4<				2.00	0.002
810127	1030	20516	4<			4<				2.00	0.006
810223	1030	20531	4<			4<				1.00	0.001<
810324	1150	20546	4			4<				2.00	0.006
810427	0850	20561	4			4<				3.00	0.008
810505	1005	20576	4			4<				210.00	0.120
810526	1045	20582	24			8				20.00	0.017
810630	1610	20597	4<			4				6.00	0.008
810728	1105	20613	40			8				4.00	0.009
810825	1445	20628	52			4<				4.00	0.010
810929	1615	20643	4			4				7.00	0.011
811027	1200	20658	60			8				40.00	0.032
811124	1355	20673	4<			4<				3.00	0.006
820105	1515	30601	4			4<				1.00	0.006
820125	0950	30617	4<			4<				2.00	0.007
820222	1225	30632	4			4<				1.00	0.007
820330	1000	30647	8			4<				1.00	0.007
820427	1135	30662	12			8				6.00	0.009
820527	1130	30677	4			4<				6.00	0.009
820629	1200	30692	40			8				20.00	0.019
820727	1340	30707	4<			4<				4.00	0.006
820824	1210	30722	4			4<			90.00	3.00	0.009
820928	1345	30738	28			4<				4.00	0.006
821027	1230	30753	36			4				2.00	0.010
821201	1230	30768	36			4<				1.00	0.008

(C O N T D)

Appendix 5. (cont'd)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

N=INTERIM		TEST-NAME:	FWFLOW	TCMF	ECIGMF	ECHPN	FCMF	PSAMF	BOD5	RST	RSP	PPUT
			COLIFORM	ESCHERIC		FECAL	PSEUDOMN	BOD				PHOSPHOR
			TOTAL	HIA COLI		COLIFORM	AERUG.	5 DAY				UNF. TOT.
			MF	MF--IG		MF	MF	TOT. DEM.	RESIDUE	RESIDUE	RESIDUE	MG/L
			CNT	CNT		CNT	CNT	MG/L	TOTAL	PARTIC.	PARTIC.	MG/L
			/100ML	/100ML		/100ML	/100ML	AS 0	MG/L	MG/L	MG/L	AS P
SAMPLE	DATE	TIME	NUMBER	FLOW	DATE	TIME	NUMBER	DATE	TIME	NUMBER	DATE	TIME
YYMMDD	LMT			M3	YYMMDD	LMT		YYMMDD	LMT		YYMMDD	LMT
830104	1340		10502									
830124	1135		10517									
830225	0742		10535									
830329	1615		10553									
830426	1240		10571									
830525	1125		10589									
830628	1230		10607									
830726	1300		10625									
830823	1345		10643									
830926	1010		10661									
831025	1530		10679									
831122	1525		10697									
831220	1640		10715									
840125	1040		50502									
840222	1035		50520									
840327	1035		50538									
840425	1135		50556									
840605	1230		50574									
840626	1009		50592									
840731	1250		50610									
840829	1410		50628									
840924	1335		50644									
841029	0935		50661									
841126	0940		50676									
841217	0920		50691									
850129	1000		20601									
850219	1025		20616									
850325	1000		20631									
850429	1240		20646									
850527	1010		20661									
850625	1525		20676									
850730	1720		20691									
850826	0930		20706									
850930	1350		20727									
851028	1040		20748									
851125	1550		20763									
851216	0920		20778									
860128	1245		10401									
860225	1340		10417									
860401	1330		10433									
860429	1100		10448									

(C O N T D)

Appendix 5. (cont'd)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM TEST-NAME:		FWFLOW	TCHF	ECIGMF	ECMPN	FCHF	PSAMF	BOD5	RST	RSP	PPUT
		STREAM	COLIFORM	ESCHERIC		FECAL	PSEUDOMN	BOD			PHOSPHOR
		FLOW	TOTAL	HIA COLI		COLIFORM	AERUG.	5 DAY	RESIDUE	RESIDUE	UNF.TOT.
SAMPLE		MF	MF	MF--IG	E.COLI	MF	MF	TOT.DEM.	TOTAL	PARTIC.	MG/L
DATE	HOUR	M3	CNT	CNT	BY MPN	CNT	CNT	MG/L	MG/L	MG/L	AS P
YYMMDD	LMT	/S	/100ML	/100ML	1=FOUND	/100ML	/100ML	AS 0			
860527	1405	10467				10<		0.60	110.00	1.00	0.007
860624	1445	10489						0.40	100.00	6.00	0.011
860728	1535	10508				10AID		0.40	100.00	2.00	0.005
860826	1220	10524				30AID		0.30	130.00	25.00	0.018
860929	1145	10543				10AID		0.50	90.00	6.00	0.014
861027	1600	10567				10<		0.10	110.00	2.00	0.006
861125	1250	10588				10<		0.30	75.00	2.00	0.006
870126	1300	20501				10<		0.1	95	1	0.006
870224	1155	20516				10<		0.4	80	1	0.004
870330	1425	20531				10<		0.2	95	5	0.010
870427	1330	20546				10<		0.7	290	160	0.093
870526	1240	20562				10<		0.8	110	2	0.008
870706	0825	20578				10<		0.1	100	4	0.008
870727	1240	20594				10<		1.0	110	7	0.013
870824	1427	20610				10<		0.4	100	5	0.009
870928	1335	20626				10<		0.4	110	3	0.008
871026	1400	20642				10<		0.3	100	2	0.007
MAXIMUM		458.735	3000			108		2.4	290	210.00	0.220
ARITH MEAN		358.761	105			6		0.7	103	8	0.013
GEOM MEAN		347.312						0.6	101		
MINIMUM		175.565	1			1		0.10	75	1	0.002
STD DEV (GEOM *)		86.954						0.4	27		
# SAMP IN STATISTICS		19	105			77		111	65	176	171
% SAMP (EXCLUDED)			25			56				1	1

(CONT'D)

Appendix 5. (cont'd)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77 U T M: 16 0408550.0 5430200.0 4 REGION: 06 DISTANCE: 9.656

Appendix 5. (cont'd)

*INTERIM		TEST-NAME:	PP04FR	HARDT	ALKT	CLIDUR	PH	COLTR	TURB	COND25	NNHTFR	NNTKUR
											NH3-N	K'DAHL N
			PO4	HARDNESS	ALK	CHLORIDE				CONDUCT.	FIL.REAC	UNF.REAC
			FIL.REAC	TOTAL	TOTAL	UNF.REAC		COLOUR		25C	MG/L	MG/L
			MG/L	MG/L	MG/L	MG/L		TRUE	TURB'ITY	UMHO/CM	AS N	AS N
			AS P	AS CAC03	AS CAC03	AS CL-	PH	TCU	FTU	AT 25 C		
SAMPLE	DATE	HOURL	SAMPLE									
YMMDD	LMT	NUMBER										
730606	0950	21009	0.002		71	1	<	7.6	2.00	141	0.02	0.44
730626	1130	21032	0.002		71	1	<	7.8	1.80	142	0.01	0.25
730719	0930	21055	0.003		66	1	<	8.0	1.80	140	0.02	0.25
730809	0900	21078	0.003		73	1	<	7.8	1.10	142	0.01	<
730829	0930	21101	0.003		68	1	<	8.1	1.40	143	0.02	0.25
730918	0830	21124	0.003		70	1	<	8.0	1.40	143	0.02	0.21
731009	1115	21147	0.001		72	1	<	7.9	1.30	142	0.02	0.25
731030	1100	21170	0.001		72	1	<	8.0	1.50	142	0.01	0.19
731120	1100	21193	0.002		71	1	<	8.0	1.00	142	0.01	0.24
731211	0945	21212	0.003		71	18		8.0	3.00	144	0.02	0.22
740108	1135	34013	0.011		71	1	<	8.0	1.00	145	0.02	0.22
740129	1130	34044	0.002		72	1	<	7.9	1.40	146	0.01	0.22
740219	1055	34075	0.007		71	1	<	7.9	0.80	140	0.01	<
740312	1130	34106	0.022		76	1	<	8.0	0.50	146	0.01	0.24
740402	1140	34137			74	1	<	7.9	0.45	148	0.01	0.19
740416	0945	34168			78	1	<	7.9	1.20	146	0.01	0.18
740423	1330	34199	0.003		74	1	<	7.9	2.30	138	0.02	0.19
740507	1050	34261	0.003		70	1	<	8.0	2.50	141	0.01	0.26
740514	1130	34292			71	8		7.8	5.50	135	0.02	0.23
740530	1100	34230	0.006		72	1	<	7.9	2.30	138	0.01	0.20
740604	1000	34323	0.003		68	1	<	7.9	2.30	142	0.02	0.21
740626	0745	34354	0.005		78	1	<	7.7	1.40	139	0.02	0.28
740717	0830	34385	0.001		71	1	<	7.7		140	0.02	0.26
740807	1600	34416			71			7.9	1.30	140	0.03	0.38
740902	1445	34447	0.002		71	1		8.0	1.30	139	0.02	0.20
740930	1340	34478	0.004		73	1		7.8	1.50	138	0.02	0.22
741023	1515	34509	0.002		68	1		6.7	1.40	141	0.01	0.25
741118	1115	34543	0.005		75	1		7.8	2.60	141	0.04	0.20
741209	1230	34573	0.003		89	1		7.7	1.50	143	0.02	0.23
750113	1200	33017	0.004		72	1		7.7	1.00	144	0.01	0.26
750210	1340	33048			79			7.6	1.20	143	0.01	0.14
750310	1245	33079	0.003		77	1	<	7.7	0.70	142	0.02	0.17
750402	1315	33110	0.004		77	1	<	7.6	0.70	144	0.03	0.19
750408	1315	33141	0.003		78	1	<	7.7	0.65	144	0.03	0.19
750415	1240	33172	0.004		77	1	<	7.7	0.75	138	0.04	0.25
750422	1600	33203	0.003	76	75	1	<	7.7	1.00	139	0.01	0.25
750506	1330	33234			68	1		7.6	1.30	137	0.02	0.28
750604	1000	33265	0.002		69	1	<	7.9	1.50	139	0.03	0.25
760302	1300	10046	0.004			1.000			0.70	144.0	0.010	0.210
760322	1100	10067	0.002			1.000	<	7.50	1.10	140.0	0.010	0.240
760421	0900	10112	0.002			1.000		7.40	2.70	124.0	0.010	0.220

(C O N T D)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM TEST-NAME:		PP04FR	HARDT	ALKT	CLIDUR	PH	COLTR	TURB	COND25	NNHTFR	NNTKUR
		PO4	HARDNESS	ALK	CHLORIDE				CONDUCT.	NH3-N	K'DAHL N
		FIL.REAC	TOTAL	TOTAL	UNF.REAC		COLOUR		25C	FIL.REAC	UNF.REAC
SAMPLE	DATE	MG/L	MG/L	MG/L	MG/L		TRUE	TURB'ITY	UMHO/CH	MG/L	MG/L
YYMMDD	HOUR	AS P	AS CAC03	AS CAC03	AS CL-	PH	TCU	FTU	AT 25 C	AS N	AS N
760426	1020	10122	0.004		1.000	7.30		47.00	121.0	0.030	0.300
760518	1025	10177	0.003		1.000	7.70		13.00	139.0	0.040	0.210
760621	1115	10224	0.006		1.000<	7.80		7.30	141	0.020	0.200
760713		10239	0.001		1	7.8		1.3	136	0.01	0.46
760810	0900	10285	0.002		1	7.5		1.4	138	0.010	0.180
760921	1200	10327	0.002		1.000	7.80		3.30	140.0	0.010	0.230
761122	1115	10389	0.002		1.000<	7.60		3.70	140.0	0.020	0.240
761214	1530	10423	0.002		1.000<	7.60		1.20	142.0	0.010	0.150
770118	1400	15014	0.002		1.000<	7.50		0.85	142.0	0.020	0.200
770222	1300	15048	0.013		1.000<	7.50		0.85	139.0	0.020	0.170
770321	0920	15080	0.002		1.000	7.50		2.70	144.0	0.020	0.180
770419	2000	15110	0.001		1.000<	7.40		5.80	145.0	0.020	0.250
770426	2000	15128	0.003		1.000<	7.90		10.00	138.0	0.020	0.230
770531	1140	15163	0.001		1.000	8.00		1.70	137.0	0.010	0.180
770627	1430	15212			1.000	7.70		1.20	142.0	0.100	0.250
770712	1400	15228	0.001<		1.000	7.80		2.60	142.0	0.020	0.500
770823	1545	15292	0.001	70.000	2.000	8.10		0.70	142	0.010	0.20
770927	2115	15332	0.002		1.000	7.50		4.30	144.0	0.020	0.150
780104	1355	20505	0.005		1.000	7.20		1.70	147.0	0.020	0.220
780207	1510	20519	0.004		1.000	7.50		1.60	154.0	0.020	0.180
780307	1500	20536	0.002		1.000	8.00		0.80	150.0	0.010<	0.120
780404	1500	20553	0.002		4.000	7.90		0.75	159.0	0.010<	0.170
780501	0952	20570	0.001<		3.000	7.50		3.30	160.0	0.020	0.300
780509	1150	20587	0.001		1.000	7.90		2.40	139.0	0.010	0.230
780605	1015	20598	0.001<		1.000	7.90		3.20	137.0	0.020	0.320
780703	0947	20613	0.001		2.000	7.90		1.60	145.0	0.010	0.240
780807	1030	20630	0.002		2.000	8.20		3.10	147.0	0.010	0.340
780905	1020	20646	0.002		1.000	8.10		1.00	149.0	0.010	0.180
781002	1045	20655	0.001		1.000	8.00		1.20	147.0	0.010	0.150
781030	1045	20670	0.001		1.000	8.00		1.50	148.0	0.010<	0.230
781205	1205	20687	0.001<		1.000	7.90		1.30	149.0	0.010<	0.130
	1240	20700	0.003	70.000	1.000	8.00		0.70	150.0	0.010	0.150
790104	1100	30505	0.002			7.90					0.320
790205	1035	30519	0.001			7.80					0.160
790305	1200	30532	0.001			7.70					0.160
790403	1230	30550	0.001			8.00					0.190
790502	1200	30553	0.001			8.10					0.270
790508	1140	30566	0.002			8.10					0.270
790607	1330	30572	0.001			8.30					0.240
790704	1308	30585	0.001			8.30					0.200
790808	1235	30598	0.002			8.40					0.180

Appendix 5. (cont'd)

(CONT'D)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM TEST-NAME:		PP04FR	HARDT	ALKT	CLIDUR	PH	COLTR	TURB	COND25	NNHTFR	NNTKUR
		P04	HARDNESS	ALK	CHLORIDE				CONDUCT.	NH3-N	K'DAHL N
		FIL.REAC	TOTAL	TOTAL	UNF.REAC		COLOUR		25C	TOTAL	TOTAL
SAMPLE		MG/L	MG/L	MG/L	MG/L		TRUE	TURB'ITY	UMHO/CM	FIL.REAC	UNF.REAC
DATE	HOUR	AS P	AS CAC03	AS CAC03	AS CL-	PH	TCU	FTU	AT 25 C	MG/L	MG/L
YYMMDD	LMT	NUMBER								AS N	AS N
790905	1040	30611	0.001	69		8.10					0.170
791001	1230	30628	0.001	69		8.00					0.170
791106	1215	30637	0.001	70		7.90					0.170
791203	1050	30651	0.001<	69		7.80					0.230
800108	1700	10501	0.001	70		7.80					0.210
800129	1010	10514	0.001	70		7.70			146.0		0.160
800226	1130	10528	0.001	73.0		7.80			142.0		0.120
800317	1130	10542	0.001<	74.0		7.80			150.0		0.150
800428	1115	10556	0.001	71.0		7.90			145.0		0.120
800506	1255	10570	0.002	71.0		8.00					0.300
800527	1040	10578	0.001	69.0		8.00					0.210
800624	1425	10592	0.001<	69.0		8.00			144.0		0.180
800728	1255	10607	0.001<	69		8.3			147		0.19
800826	1430	10622	0.002	71.0		8.20			145.0		0.200
800930	1025	10637	0.001<	75.0		8.00			145.0		0.190
801027	1240	10652	0.001<	74.0		8.00			150.0		0.260
801125	1120	10667	0.001<	69.0		8.00			146.0		0.170
810127	1030	20516	0.002	71.0		8.00			150.0		0.150
810223	1030	20531	0.001<	71.0		7.90			149.0		0.110
810324	1150	20546	0.002	71.0		8.00			150.0		0.200
810427	0850	20561	0.001<	69.0		7.90			138.0		0.190
810505	1005	20576	0.005	96.0		7.70			142.0		0.250
810526	1045	20582	0.002	72.0		7.90			150.0		0.230
810630	1610	20597	0.002	69.0		8.00			155.0		0.190
810728	1105	20613	0.006	69.0		8.50			145.0		0.210
810825	1445	20628	0.001	69.0		8.30			150.0		0.190
810929	1615	20643	0.002	71.0		8.20			155.0		0.280
811027	1200	20658	0.002	71.0		8.10			148.0		0.160
811124	1355	20673	0.001<	69.0		8.00			150.0		0.180
820105	1515	30601	0.001<	71.0		7.80			153.0		0.230
820125	0950	30617	0.001	72.0		7.80			155.0		0.130
820222	1225	30632	0.006	72.0		7.80			154.0		0.140
820330	1000	30647	0.003	74.0		7.70			156.0		0.180
820427	1135	30662	0.001	74.0		7.80			156.0		0.180
820527	1130	30677	0.002	67.0		8.10			146.0		0.200
820629	1200	30692	0.002	73.0		8.30			150.0		0.220
820727	1340	30707	0.001	70.0		8.40			150.0		0.210
820824	1210	30722	0.001<	70.0		8.30			150.0		0.180
820928	1345	30738	0.001<	71.0		8.20			152.0		0.200
821027	1230	30753	0.001<	70.0		8.00			149.0		0.220
821201	1230	30768	0.002	69.0		7.90			148.0		0.200

Appendix 5. (cont'd)

(C O N T D)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

Appendix 5. (cont'd)

**=INTERIM		TEST-NAME:	PP04FR	HARDT	ALKT	CLIDUR	PH	COLTR	TURB	COND25	NNHTFR	NNTKUR
			P04	HARDNESS	ALK	CHLORIDE				CONDUCT.	NH3-N	K'DAHL N
			FIL.REAC	TOTAL	TOTAL	UNF.REAC		COLOUR		25C	TOTAL	TOTAL
SAMPLE	DATE	HOURL	SAMPLE	MG/L	MG/L	MG/L	MG/L	TRUE	TURB'ITY	UMHO/CM	FIL.REAC	UNF.REAC
YYMMDD	LMT	NUMBER	AS P	AS CAC03	AS CAC03	AS CL-	PH	TCU	FTU	AT 25 C	MG/L	MG/L
											AS N	AS N
830104	1340	10502	0.002		73.0		7.90			154.0		0.200
830124	1135	10517	0.003		73.0		8.00			154.0		0.330
830225	0742	10535	0.001		74.0		7.80			156.0		0.170
830329	1615	10553	0.002		73.0		7.90			156.0		0.220
830426	1240	10571	0.002		69.0		7.90		0.85	148.0		0.210
830525	1125	10589	0.004		67.0		7.90		39.00	148.0		0.360
830628	1230	10607	0.002		74.0		8.00		1.20	145.0		0.330
830726	1300	10625	0.002		71.0		8.20		1.60	145.0		0.240
830823	1345	10643	0.001		72.0		8.20		3.10	142.0		0.220
830926	1010	10661	0.002		73.0		8.00		1.70	149.0		0.240
831025	1530	10679	0.003		73.0		8.00		2.10	148.0		0.220
831122	1525	10697	0.004		73.0		7.90		0.85	147.0		0.200
831220	1640	10715	0.005		75.0		7.80		0.75	149.0		0.190
840125	1040	50502	0.004		75.0		7.60		0.85	159.0		0.190
840222	1035	50520	0.003		71.0		8.00		7.10	157.0		0.200
840327	1035	50538	0.002		74.0		8.10		0.55	159.0		0.190
840425	1135	50556	0.001		70.0		8.10		0.75	147.0		0.220
840605	1230	50574	0.002		67.0		8.00		0.75	143.0		0.210
840626	1009	50592	0.001<		67.0		8.10		0.90	144.0		0.012
840731	1250	50610	0.005		67.0		8.30		1.20	136.0		0.250
840829	1410	50628	0.001		70.0				2.20	152.0		0.230
840924	1335	50644	0.001		71.0		8.20		1.70	146.0		0.180
841029	0935	50661	0.001<		67.0		8.00		0.95	148.0		0.180
841126	0940	50676	0.001		67.0				0.85	153.0		0.180
841217	0920	50691	0.002		69.0				3.6	146.0		0.200
850129	1000	20601	0.005		69.0				0.75	140.0		0.180
850219	1025	20616	0.002		73.0				0.90	140.0		0.170
850325	1000	20631	0.002		70.0				0.60	155.0		0.150
850429	1240	20646	0.001		72.0				1.50	134.0		0.180
850527	1010	20661	0.002		72.0				5.40	152.0		0.200
850625	1525	20676	0.001		71.0				1.20	146.0		0.200
850730	1720	20691	0.002		73.0				2.00	153.0		0.210
850826	0930	20706	0.001		73.0			10000.0	1.80	142.0		0.200
850930	1350	20727	0.001		70.0			18000.0	2.90	150.0		0.210
851028	1040	20748	0.002		72.0			12000.0	1.30	152.0		0.170
851125	1550	20763	0.002		71.0			12000.0	1.10	144.0		0.150
851216	0920	20778	0.003		73.0			11000.0	1.10	153.0		0.170
860128	1245	10401	0.003		72.0			11000.0	0.95	156.0		0.180
860225	1340	10417	0.002		74.0			11000.0	0.70	157.0		0.150
860401	1330	10433	0.002		72.0			12000.0	0.60	155.0		0.170
860429	1100	10448	0.005		71.0		8.00	14000.0	2.20	152.0		0.200

(CONT'D)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

Appendix 5. (cont'd)

*INTERIM TEST-NAME:		PP04FR	HARDT	ALKT	CLIDUR	PH	COLTR	TURB	COND25	NNHTFR	NNTKUR	
		PO4	HARDNESS	ALK	CHLORIDE				CONDUCT.	NH3-N	K'DAHL N	
SAMPLE		FIL.REAC	TOTAL	TOTAL	UNF.REAC		COLOUR		25C	TOTAL	TOTAL	
DATE	HOUR	MG/L	MG/L	MG/L	MG/L		TRUE	TURB'ITY	UMHO/CM	FIL.REAC	UNF.REAC	
YYMMDD	LMT	AS P	AS CACO3	AS CACO3	AS CL-	PH	TCU	FTU	AT 25 C	MG/L	MG/L	
										AS N	AS N	
860527	1405	10467	0.002		71.0		8.10	15000.0	1.30	142.0		0.250
860624	1445	10489	0.003		73.0		8.10	15000.0	2.70	142.0		0.220
860728	1535	10508	0.001<		73.0			12000.0	1.80	144.0		0.190
860826	1220	10524	0.006		75.0			15000.0	7.40	154.0		0.350
860929	1145	10543	0.002		74.0			12000.0	2.60	146.0		0.220
861027	1600	10567	0.001		71.0	8.10	11000.0	1.40	146.0		0.190	
861125	1250	10588	0.003		72.0		12000.0	0.80	153.0		0.200	
870126	1300	20501	0.003		76.0		11.0	0.75	158.00		0.180	
870224	1155	20516	0.002		75.0	8.00	12.0	0.70		0.010	0.160	
870330	1425	20531	0.002		74.0		11.0	2.00			0.220	
870427	1330	20546	0.009		75.0		14.0	61.00			0.280	
870526	1240	20562	0.001<		73.0		12.0	1.80			0.220	
870706	0825	20578	0.003		74.0		11.0	3.20			0.220	
870727	1240	20594	0.001<		76.0		12.0	3.10			0.220	
870824	1427	20610	0.003		76.0		12.0	4.30			0.200	
870928	1335	20626	0.004		75.0		11.0	2.80			0.290	
871026	1400	20642	0.003		74.0		12.0	1.80			0.210	
MAXIMUM		0.022	76	96.0	18	8.50	18000.0	61.00	160.0	0.100	0.500	
ARITH MEAN		0.003	72	72	2	7.9	7812.2	3.1	146	0.02	0.21	
GEOM MEAN			72	72		7.9	858.6	1.7	146		0.20	
MINIMUM		0.001	70.000	66	1	6.7	11.0	0.45	121.0	0.01	0.012	
STD DEV (GEOM *)			3	4		0.2	6499.8	7.6	6		0.06	
# SAMP IN STATISTICS		151	3	148	34	149	26	126	156	68	180	
% SAMP (EXCLUDED)		13			52					8		

(C O N T D)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIOR

STORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM		TEST-NAME:	NNO2FR	NNO3FR	ACDT	SS04UR	SIO3UR	NAUR	DO	CCNAUR	CDUT	COUT
			NNO2-N	NNO3-N	ACIDITY	SULPHATE	SILICATE	SODIUM	DISOLVED	CYANIDE	CADMIUM	COBALT
SAMPLE			FIL.REAC	FIL.REAC	TOTAL	UNF.REAC	UNF.REAC	UNF.REAC	OXYGEN	AVAIL	UNF.TOT.	UNF.TOT.
DATE	HOUR	SAMPLE	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
YYMMDD	LMT	NUMBER	AS N	AS N	AS CACO3	AS SO4	AS SI	AS NA	AS O	AS HCN	AS CD	AS CO
730606	0950	21009	0.002	0.030			1.868		13.5			
730626	1130	21032	0.003	0.050			2.615		12.5			
730719	0930	21055	0.003	0.020			1.587		11.0			
730809	0900	21078	0.002	0.020			1.634		9.0			
730829	0930	21101	0.003	0.010<			1.587		9.5			
730918	0830	21124	0.003	0.010<		5		2.00	9.0		0.004 <	
731009	1115	21147	0.002	0.010<			1.401		9.0			
731030	1100	21170	0.002	0.010			1.681		10.0			
731120	1100	21193	0.001	0.010			2.241		13.0	0.010<		
731211	0945	21212	0.001	0.020			1.587		12.7			
740108	1135	34013	0.002	0.020			1.914		11.0			
740129	1130	34044	0.002	0.040			1.634		12.0			
740219	1055	34075	0.001	0.040			2.008		12.2			
740312	1130	34106	0.002	0.040			1.541		13.5			
740402	1140	34137	0.003	0.040			1.868		15.5			
740416	0945	34168	0.002	0.050			1.634		15.5			
740423	1330	34199	0.002	0.040			1.447		14.0			
740507	1050	34261	0.002	0.030			2.008		14.5	0.01 <		
740514	1130	34292	0.004	0.030			1.727		14.8			
740530	1100	34230	0.002	0.030		5	1.587	1.00	14.0		0.001 <	
740604	1000	34323	0.002	0.010<			1.681		12.4			
740626	0745	34354	0.002	0.020					11.0			
740717	0830	34385	0.003	0.010<		6	1.681	1.50	10.0		0.010 <	
740807	1600	34416	0.003	0.010<			1.587		10.7	0.01 <		
740902	1445	34447	0.003	0.010			1.401		10.4			
740930	1340	34478	0.001	0.050			1.167		10.8			
741023	1515	34509	0.001	0.050			1.447		13.0			
741118	1115	34543	0.002	0.020			1.307		10.0			
741209	1230	34573	0.003	0.040			1.447		11.0			
750113	1200	33017	0.002	0.030			1.634		13.2			
750210	1340	33048	0.002	0.040			8.20		10.2			
750310	1245	33079	0.002	0.030			1.80		12.6			
750402	1315	33110	0.002	0.030			7.50					
750408	1315	33141	0.002	0.030			2.30		13.2			
750415	1240	33172	0.003	0.040			2.30		12.4			
750422	1600	33203	0.002	0.050		3	2.80	2.10	13.1		0.001 <	
750506	1330	33234	0.004	0.030			1.90		12.6			
750604	1000	33265	0.003	0.020			2.00		12.0			
760302	1300	10046	0.002	0.020					13.0			
760322	1100	10067	0.003	0.030		2.000			12.5			
760421	0900	10112	0.003	0.020		3.000	1.750		14.0			

(C O N T D)

Appendix 5. (cont'd)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

#=INTERIM		TEST-NAME:	NNO2FR	NNO3FR	ACDT	SS04UR	SIO3UR	NAUR	DO	CCNAUR CYANIDE	CDUT	COUT
			NO2-N FIL.REAC	NO3-N FIL.REAC	ACIDITY TOTAL	SULPHATE UNF.REAC	SILICATE UNF.REAC	SODIUM UNF.REAC	DISOLVED OXYGEN	AVAIL UNF.REAC	CADMIUM UNF.TOT.	COBALT UNF.TOT.
SAMPLE DATE	HOUR YYMMDD LMT	SAMPLE NUMBER	MG/L AS N	MG/L AS N	MG/L AS CACO3	MG/L AS SO4	MG/L AS SI	MG/L AS NA	MG/L AS O	MG/L AS HCN	MG/L AS CD	MG/L AS CO
760426	1020	10122	0.003	0.020		4.000	1.800		13.6		0.010 <	
760518	1025	10177	0.002	0.020		10.000	1.500		14.0			
760621	1115	10224	0.002	0.010		1.000	1.600		11.0			
760713		10239	0.002	0.01 <		1.0	1.45					
760810	0900	10285	0.002	0.010		7.0	1.500		9.6		0.002 <	
760921	1200	10327	0.002	0.010		4.500	1.400		10.2			
761122	1115	10389	0.001	0.030		2.000			12.2			
761214	1530	10423	0.002	0.020		1.000	1.450		15.0			
770118	1400	15014	0.002	0.030		3.000	1.5		10.3			
770222	1300	15048	0.002	0.050		0.500<	1.900		15.0		0.002 <	
770321	0920	15080	0.001	0.030		1.000	1.700		14.5			
770419	2000	15110	0.002	0.040		2.000	1.600		13.9		0.002 <	
770426	2000	15128	0.003	0.040		1.000<	2.950		13.9		0.002 <	
770531	1140	15163	0.002	0.020		0.500	1.550		11.8			
770627	1430	15212	0.005	0.060		2.000	1.400		10.4			
770712	1400	15228	0.002	0.010		1.000	1.500		13.8		0.001	
770823	1545	15292	0.003	0.010	1.000	2.000	1.700		10.6			
770927	2115	15332	0.001	0.010<		2.000	1.500		11.8			
780104	1355	20505	0.002	0.030		2.000			14.0			
780207	1510	20519	0.003	0.030		3.000	1.900		12.7		0.001	
780307	1500	20536	0.001	0.040		2.500	1.800		11.0			
780404	1500	20553	0.001	0.100		1.200	1.800					
780501	0952	20570	0.001	0.090		1.600	1.8	0.950	15.0		0.001 <	
780509	1150	20587	0.002	0.060		1.500	1.760		11.4			
780605	1015	20598	0.001	0.060		2.200	1.700		12.6			
780703	0947	20613	0.002	0.050		4.800	1.600		9.0			
780807	1030	20630	0.001	0.040		1.500	1.900		10.4		0.001 <	
780905	1020	20646	0.002	0.040		1.700	2.100		8.0			
781002	1045	20655	0.002	0.050		2.100	1.600		9.2		0.001 <	
781030	1045	20670	0.002	0.050		0.600	1.700					
781205	1205	20687	0.001	0.080		1.900	1.700		12.5			
	1240	20700	0.001	0.080	2.000	1.700			13.0		0.001 <	0.001 <
790104	1100	30505	0.001	0.100							0.001 <	
790205	1035	30519	0.001	0.100					11.7		0.001 <	
790305	1200	30532	0.002	0.110					12.0		0.001	
790403	1230	30550	0.001	0.100					11.8		0.001 <	
790502	1200	30553	0.002	0.090					12.7		0.001	
790508	1140	30566	0.002	0.070					15.4		0.005 <	
790607	1330	30572	0.002	0.050					12.6		0.008	
790704	1308	30585	0.001	0.030					11.8		0.001 <	
790808	1235	30598	0.002	0.020					9.6		0.001 <	

(C O N T D)

Appendix 5. (cont'd)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

#=INTERIM		TEST-NAME:	NNO2FR	NNO3FR	ACDT	SS04UR	SI03UR	NAUR	DO	CCNAUR CYANIDE	CDUT	COUT
			NO2-N FIL.REAC	NO3-N FIL.REAC	ACIDITY TOTAL	SULPHATE UNF.REAC	SILICATE UNF.REAC	SODIUM UNF.REAC	DISOLVED OXYGEN	AVAIL UNF.REAC	CADMIUM UNF.TOT.	COBALT UNF.TOT.
SAMPLE DATE	HOUR LMT	SAMPLE NUMBER	MG/L AS N	MG/L AS N	MG/L AS CAC03	MG/L AS S04	MG/L AS SI	MG/L AS NA	MG/L AS O	MG/L AS HCN	MG/L AS CD	MG/L AS CO
790905	1040	30611	0.002	0.030					11.8		0.002	
791001	1230	30628	0.001	0.030					9.5		0.001	
791106	1215	30637	0.001	0.050					12.2		0.001 <	
791203	1050	30651	0.001<	0.070					7.8		0.001	
800108	1700	10501	0.001	0.090					13.2		0.001 <	
800129	1010	10514	0.001	0.100					12.2		0.001 <	
800226	1130	10528	0.001<	0.100					12.5		0.0010	
800317	1130	10542	0.001	0.100					13.4		0.001	
800428	1115	10556	0.001	0.090					14.0		0.001	
800506	1255	10570	0.001	0.080					10.0		0.001	
800527	1040	10578	0.001	0.060					12.1		0.001	
800624	1425	10592	0.001	0.040					11.2		0.001	
800728	1255	10607	0.001	0.01					10.3		0.001 <	
800826	1430	10622	0.003	0.020					8.0		0.001	
800930	1025	10637	0.001	0.010					11.0		0.001	
801027	1240	10652	0.002	0.040					11.4		0.0010	
801125	1120	10667	0.001<	0.060					9.4		0.001	
810127	1030	20516	0.001<	0.090					13.6		0.0010	
810223	1030	20531	0.001	0.100					12.8		0.0010<	
810324	1150	20546	0.001	0.090					13.4		0.0030	
810427	0850	20561	0.001	0.070					13.6		0.0010	
810505	1005	20576	0.002	0.010<					11.7		0.0010<	
810526	1045	20582	0.002	0.050					10.8		0.0010	
810630	1610	20597	0.002	0.040							0.0010	
810728	1105	20613	0.002	0.020					9.2		0.0020	
810825	1445	20628	0.001	0.010					9.2		0.0010	
810929	1615	20643	0.003	0.020					9.9		0.0010	
811027	1200	20658	0.001	0.020					10.8		0.0010	
811124	1355	20673	0.004	0.060					10.0		0.0010<	
820105	1515	30601	0.002	0.070					12.6		0.0005<	
820125	0950	30617	0.002	0.080					13.4		0.0005<	
820222	1225	30632	0.001<	0.100					11.2		0.0005<	
820330	1000	30647	0.001	0.100					12.4		0.0005<	
820427	1135	30662	0.002	0.110					13.6		0.0005<	
820527	1130	30677	0.002	0.050					11.5		0.0007	
820629	1200	30692	0.002	0.010					12.2		0.0005<	
820727	1340	30707	0.001	0.010<					9.9		0.0005<	
820824	1210	30722	0.001<	0.010<					9.0		0.0005<	
820928	1345	30738	0.001<	0.010<					9.7		0.0005<	
821027	1230	30753	0.001<	0.040					9.8		0.0005<	
821201	1230	30768	0.002	0.060					13.8		0.0005<	

(CONT'D)

Appendix 5. (cont'd)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM TEST-NAME:		NO2FR	NO3FR	ACDT	SS04UR	SIO3UR	NAUR	DO	CCNAUR CYANIDE AVAIL	CDUT	COUT
SAMPLE DATE	HOUR	SAMPLE FIL.REAC MG/L	NO2-N FIL.REAC MG/L	NO3-N FIL.REAC MG/L	ACIDITY TOTAL MG/L	SULPHATE UNF.REAC MG/L	SILICATE UNF.REAC MG/L	SODIUM UNF.REAC MG/L	DISOLVED OXYGEN MG/L	CADMIUM UNF.TOT. MG/L	COBALT UNF.TOT. MG/L
YYMMDD	LMT	NUMBER	AS N	AS N	AS CACO3	AS SO4	AS SI	AS NA	AS O	AS HCN	AS CD
830104	1340	10502	0.001<	0.070					12.5	0.0005<	
830124	1135	10517	0.001<	0.070					14.0	0.0005<	
830225	0742	10535	0.001<	0.080					13.4	0.0010	
830329	1615	10553	0.001<	0.080					13.8	0.0010	
830426	1240	10571	0.001<	0.070					13.2	0.0005<	
830525	1125	10589	0.003	0.050					12.4	0.0005<	
830628	1230	10607	0.062	0.320					11.8		
830726	1300	10625	0.004	0.010<					9.4	0.010	
830823	1345	10643	0.001	0.010<					8.4	0.0005<	
830926	1010	10661	0.002	0.010<					9.3	0.0005<	
831025	1530	10679	0.002	0.020					10.6	0.0005<	
831122	1525	10697	0.001<	0.060					13.2	0.0005<	
831220	1640	10715	0.001	0.080					11.0	0.0005<	
840125	1040	50502	0.001	0.070					12.8	0.0005<	
840222	1035	50520	0.001	0.090					13.4	0.0005<	
840327	1035	50538	0.001<	0.080					12.7	0.0006	
840425	1135	50556	0.001<	0.070					12.7	0.0005<	
840605	1230	50574	0.002	0.050					13.4	0.0005<	
840626	1009	50592	0.002	0.020					9.9	0.0005<	
840731	1250	50610	0.001	0.010<					9.7	0.0005<	
840829	1410	50628	0.001	0.010<					10.8	0.0005<	
840924	1335	50644	0.001	0.020					9.6	0.0005<	
841029	0935	50661	0.001	0.040					9.9	0.0005<	
841126	0940	50676	0.001<	0.060					12.4	0.0005<	
841217	0920	50691	0.001	0.074					13.6	0.0005	
850129	1000	20601	0.003	0.100					14.1	0.0005<	
850219	1025	20616	0.002	0.090					14.1	0.0005	
850325	1000	20631	0.001	0.090					12.9	0.0005<	
850429	1240	20646	0.001	0.060					13.4	0.0005<	
850527	1010	20661	0.002	0.040						0.0005<	
850625	1525	20676	0.002	0.034					10.4	0.0005<	
850730	1720	20691	0.002	0.022					9.0	0.0005<	
850826	0930	20706	0.004	0.020					9.5	0.0005<	
850930	1350	20727	0.002	0.020					10.1	0.0005<	
851028	1040	20748	0.001	0.040					11.2	0.0005<	
851125	1550	20763	0.002	0.060					12.2	0.0005<	
851216	0920	20778	0.002	0.070					13.3	0.0005<	
860128	1245	10401	0.001	0.090					12.3	0.0005<	
860225	1340	10417	0.002	0.090					12.6	0.0006	
860401	1330	10433	0.004	0.080					13.9	0.0005<	
860429	1100	10448	0.001	0.060					13.0	0.0006	

Appendix 5. (cont'd)

(C O N T D)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIOR

STORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM TEST-NAME:		NN02FR	NN03FR	ACDT	SS04UR	SIO3UR	NAUR	DO	CCNAUR CYANIDE	CDUT	COUT
		NO2-N FIL.REAC	NO3-N FIL.REAC	ACIDITY TOTAL	SULPHATE UNF.REAC	SILICATE UNF.REAC	SODIUM UNF.REAC	DISOLVED OXYGEN	AVAIL UNF.REAC	CADMIUM UNF.TOT.	COBALT UNF.TOT.
SAMPLE DATE	HOUR	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
YYMMDD	LMT	AS N	AS N	AS CACO3	AS S04	AS SI	AS NA	AS O	AS HCN	AS CD	AS CO
860527	1405	10467	0.002	0.060				12.4		0.0005<	0.0020<
860624	1445	10489	0.002	0.027				11.0		0.0005<	
860728	1535	10508	0.001<	0.020				11.0		0.0005<	
860826	1220	10524	0.007	0.009				9.1		0.0005<	
860929	1145	10543	0.001<	0.010				9.5		0.0005<	
861027	1600	10567	0.001	0.030				12.0		0.0005<	
861125	1250	10588	0.001	0.050				11.8		0.0005<	
870126	1300	20501	0.001	0.080				14.00		0.0005<	
870224	1155	20516	0.001	0.080						0.0005<	
870330	1425	20531	0.001<	0.070				13.00		0.0005	
870427	1330	20546	0.001<	0.040						0.0005<	
870526	1240	20562	0.002	0.040				10.20		0.0005<	
870706	0825	20578	0.001	0.010				8.90		0.0005<	
870727	1240	20594	0.001<	0.010				8.30		0.0005<	
870824	1427	20610	0.001<	0.010				9.80		0.0005<	
870928	1335	20626	0.001<	0.020				8.60		0.0005<	
871026	1400	20642	0.001	0.020				12.20		0.0010	
MAXIMUM		0.062	0.320	2.000	10.000	8.20	2.10	15.5		0.010	
ARITH MEAN		0.002	0.05	1.500	3	1.9	1.51	11.8		0.001	
GEOM MEAN				1.414		1.8	1.43	11.6			
MINIMUM		0.001	0.009	1.000	0.500	1.167	0.950	7.8		0.0005	
STD DEV (GEOM *)				0.707		1.1	0.54	1.8			
# SAMP IN STATISTICS		157	164	2	35	66	5	172		38	
% SAMP (EXCLUDED)		13	9		7					68	

Appendix 5. (cont'd)

(CONT'D)

B.O.M./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

Appendix 5. (cont'd)

*INTERIM TEST-NAME:		CUUT COPPER	ZNUT ZINC	PBUT LEAD	NIUT NICKEL	FEUT IRON	MNUT MANGANESE	CRUT CHROMIUM	HGUT MERCURY	ASUT ARSENIC	ALUT ALUMINUM
SAMPLE DATE	HOUR YYMMDD LMT	UNF.TOT. MG/L AS CU	UNF.TOT. MG/L AS ZN	UNF.TOT. MG/L AS PB	UNF.TOT. MG/L AS NI	UNF.TOT. MG/L AS FE	UNF.TOT. MG/L AS MN	UNF.TOT. MG/L AS CR	UNF.TOT. UG/L AS HG	UNF.TOT. MG/L AS AS	UNF.TOT. MG/L AS AL
730606	0950						0.04 <				
730626	1130						0.04				
730719	0930						0.07				
730809	0900						0.02 <				
730829	0930						0.02 <				
730918	0830	0.01 <	0.001 <	0.01 <	0.01 <	0.10	0.04 <	0.005 <			
731009	1115						0.04 <				
731030	1100						0.07				
731120	1100						0.02 <		0.10 <	0.02	
731211	0945						0.02 <				
740108	1135						0.02 <				
740129	1130						0.02 <				
740219	1055						0.02 <				
740312	1130						0.04 <				
740402	1140						0.02 <				
740416	0945						0.02 <				
740423	1330						0.02 <				
740507	1050						0.02 <		0.100 <	0.01	
740514	1130						0.02 <				
740530	1100	0.01 <	0.001 <	0.01 <	0.01 <	0.20	0.04 <	0.050 <			0.22
740604	1000						0.02 <				
740626	0745						0.04 <				
740717	0830	0.01	0.002 <	0.01 <	0.01 <	0.15	0.04 <				0.07
740807	1600						0.04 <		0.100 <	0.03 <	
740902	1445						0.01 <				
740930	1340						0.04 <				
741023	1515						0.04 <				
741118	1115						0.04 <				
741209	1230						0.04 <				
750113	1200						0.02 <				
750210	1340						0.04 <				
750310	1245						0.01 <				
750402	1315						0.01				
750408	1315						0.01				
750415	1240						0.01 <				
750422	1600		0.010 <	0.01 <	0.01 <	0.15	0.02 <	0.040 <			0.11
750506	1330						0.04 <				
750604	1000						0.04 <				
760322	1100					0.05					
760421	0900					0.050 <	0.020				
760426	1020	0.010 <	0.020 <	0.010 <	0.010 <	2.000		0.010	0.050 <	0.002	
760518	1025					0.700					

(C O N T D)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIOR

STORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM TEST-NAME:		CUUT COPPER	ZNUT ZINC	PBUT LEAD	NIUT NICKEL	FEUT IRON	MNUT MANGANESE	CRUT CHROMIUM	HGUT MERCURY	ASUT ARSENIC	ALUT ALUMINUM
SAMPLE DATE	HOUR	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. UG/L	UNF.TOT. MG/L	UNF.TOT. MG/L
YYMMDD	LMT	AS CU	AS ZN	AS PB	AS NI	AS FE	AS MN	AS CR	AS HG	AS AS	AS AL
760621	1115	10224				0.450					
760713		10239				0.14					
760810	0900	10285	0.009	0.005	0.012 <	0.10		0.030	50	<	0.010 <
760921	1200	10327				0.200					
761122	1115	10389				0.250					
761214	1530	10423				0.100					
770118	1400	15014				0.050 <					
770222	1300	15048	0.013	0.017	0.012 <	0.100		0.020 <	0.050 <	0.001	
770321	0920	15080				0.150					
770419	2000	15110	0.005	0.004 <	0.012 <	0.160		0.002 <	0.090	0.010 <	
770426	2000	15128	0.007	0.016	0.007	0.430		0.010	0.050 <	0.030	
770531	1140	15163				0.150			0.010 <		
770627	1430	15212				0.100					
770712	1400	15228	0.006	0.012	0.012 <	0.400		0.020 <	0.05 <	0.03	
770823	1545	15292				0.200					
770927	2115	15332				0.200					
780104	1355	20505				0.100					
780207	1510	20519	0.002	0.004	0.005 <	0.100		0.020 <	0.080	0.010 <	
780307	1500	20536				0.050					
780404	1500	20553				0.050					
780501	0952	20570	0.001 <	0.001 <	0.005 <	0.150	0.001	0.020 <	0.050 <	0.010 <	
780509	1150	20587				0.250					
780605	1015	20598				0.150					
780703	0947	20613				0.150					
780807	1030	20630	0.003	0.004	0.005 <	0.071		0.020 <	0.050 <	0.004 <	
780905	1020	20646				0.100					
781002	1045	20655	0.006	0.002	0.010 <	0.060		0.020 <	0.005 <	0.004 <	
781030	1045	20670				0.050 <					
781205	1205	20687				0.100					
	1240	20700	0.003	0.002	0.010 <	0.070	0.004				
790104	1100	30505	0.002	0.005	0.010 <			0.020 <	0.050 <	0.004 <	
790205	1035	30519	0.012	0.007	0.050			0.020 <	0.010 <	0.004 <	
790305	1200	30532	0.007	0.010	0.010			0.001	0.050 <	0.002	
790403	1230	30550	0.001 <	0.002	0.170			0.001 <	0.050 <	0.002 <	
790502	1200	30553	0.002	0.002	0.002			0.001 <	0.050 <	0.002 <	
790508	1140	30566	0.005	0.005 <	0.010 <			0.003	0.050 <	0.002 <	
790607	1330	30572	0.001 <	0.001	0.007			0.001 <	0.050 <	0.003	
790704	1308	30585	0.005	0.005	0.006			0.001	0.050	0.001 <	
790808	1235	30598	0.005	0.002	0.001 <			0.001	0.050 <	0.002	
790905	1040	30611	0.004	0.001	0.001			0.001	0.050 <	0.007	
791001	1230	30628	0.002	0.002	0.004			0.001 <	0.050 <	0.001 <	
791106	1215	30637	0.009	0.001 <	0.001			0.005	0.050 <	0.001	

(C O N T D)

Appendix 5. (cont'd)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*=INTERIM	TEST-NAME:	CUUT COPPER	ZNUT ZINC	PBUT LEAD	NIUT NICKEL	FEUT IRON	MNUT MANGANESE	CRUT CHROMIUM	HGUT MERCURY	ASUT ARSENIC	ALUT ALUMINUM
SAMPLE DATE	HR	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. UG/L	UNF.TOT. MG/L	UNF.TOT. MG/L
YYMMDD	LMT	AS CU	AS ZN	AS PB	AS NI	AS FE	AS MN	AS CR	AS HG	AS AS	AS AL
791203	1050	30651	0.003	0.001	0.006			0.002		0.002	
800108	1700	10501	0.005	0.001 <	0.007			0.001	0.050 <	0.001 <	
800129	1010	10514	0.002	0.001 <	0.001 <			0.001 <	0.05 <	0.001 <	
800226	1130	10528	0.0010	0.001 <	0.001 <			0.0010<	0.0500<	0.0010	
800317	1130	10542	0.006	0.001 <	0.006 <			0.001	0.050	0.003	
800428	1115	10556	0.002	0.001	0.003			0.001 <		0.002	
800506	1255	10570	0.004	0.004	0.005			0.002	0.050 <	0.001	
800527	1040	10578	0.001	0.001	0.005			0.001	0.050 <	0.002	
800624	1425	10592	0.001	0.001 <	0.002			0.001	0.050	0.001	
800728	1255	10607	0.001 <	0.001	0.001 <			0.001	0.050 <	0.001	
800826	1430	10622	0.002	0.001 <	0.001 <			0.001 <	0.05 <	0.001 <	
800930	1025	10637	0.002	0.001	0.003			0.001 <	0.05 <	0.001 <	
801027	1240	10652	0.0010<	0.0030	0.001			0.0030	0.050 <	0.001 <	
801125	1120	10667	0.002	0.001 <	0.011			0.007	0.05 <	0.001 <	
810127	1030	20516	0.0040	0.0030	0.001			0.0010<	0.050 <	0.0010	
810223	1030	20531	0.0010	0.0010	0.004			0.0010<	0.050 <	0.0020	
810324	1150	20546	0.0040	0.0010	0.005			0.0010	0.050 <	0.0010<	
810427	0850	20561	0.0010<	0.0010	0.003	0.0820	0.003	0.0010	0.050 <	0.0010<	
810505	1005	20576	0.0070	0.0070	0.016			0.0110	0.050 <	0.0030	
810526	1045	20582	0.0040	0.003	0.001 <	0.4700	0.010	0.0030	0.050 <	0.0040<	
810630	1610	20597	0.0030	0.003	0.023	0.0900	0.005	0.0050	0.050 <	0.0040<	
810728	1105	20613	0.0100	0.005	0.001 <			0.0010<	0.050 <	0.0010	
810825	1445	20628	0.0020	0.003	0.001 <			0.0020	0.050 <	0.0010<	
810929	1615	20643	0.0010<	0.001 <	0.001 <			0.0010	0.050 <	0.0010	
811027	1200	20658	0.0040	0.003	0.003			0.0020	0.050 <	0.0040	
811124	1355	20673	0.0010<	0.001 <	0.001 <			0.0010	0.050 <	0.0010<	
820105	1515	30601	0.0020	0.0010	0.001 <			0.0010<	0.050 <	0.0020	
820125	0950	30617	0.0060	0.0020	0.012			0.0020	0.050 <	0.0010<	
820222	1225	30632	0.0040	0.003	0.006			0.0020	0.050 <	0.0010<	
820330	1000	30647	0.0060	0.003	0.005			0.0040	0.050 <	0.0010<	
820427	1135	30662	0.0030	0.0020	0.003 <			0.0070	0.050 <	0.0010<	
820527	1130	30677	0.0140	0.009	0.003 <	0.3200	0.008	0.0060	0.050 <	0.0010	
820629	1200	30692	0.0030	0.014	0.003 <			0.0030	0.050 <	0.0010<	
820727	1340	30707	0.0010	0.005	0.003 <			0.0020<	0.050 <	0.0010	
820824	1210	30722	0.0020	0.0010	0.003 <	0.1200	0.005	0.0030	0.050 <	0.0010<	
820928	1345	30738	0.0020	0.0020	0.003 <			0.0020<	0.050 <	0.0010<	
821027	1230	30753	0.0020	0.001	0.003 <	0.0610	0.003	0.0020	0.050 <	0.0010<	
821201	1230	30768	0.0020	0.001 <	0.003 <	0.0790	0.003	0.0020<	0.050 <	0.0010<	
830104	1340	10502	0.0010	0.0020	0.003 <			0.0020<	0.050 <	0.0010<	
830124	1135	10517	0.0030	0.0010	0.003 <			0.0020<	0.050 <	0.0010<	
830225	0742	10535	0.0020	0.0010<	0.003 <			0.0020<	0.050 <	0.0010<	
830329	1615	10553	0.0060	0.003	0.003 <			0.0020<	0.050 <	0.0010<	

Appendix 5. (cont'd)

(C O N T D)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIORSTORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

**INTERIM		TEST-NAME:	CUUT COPPER		ZNUT ZINC		PBUT LEAD		NIUT NICKEL		FEUT IRON		MNUT MANGANESE		CRUT CHROMIUM		HGUT MERCURY		ASUT ARSENIC		ALUT ALUMINUM	
SAMPLE DATE		HOOR YMMDD	SAMPLE NUMBER	UNF. TOT. MG/L AS CU	UNF. TOT. MG/L AS ZN	UNF. TOT. MG/L AS PB	UNF. TOT. MG/L AS NI	UNF. TOT. MG/L AS FE	UNF. TOT. MG/L AS MN	UNF. TOT. MG/L AS CR	UNF. TOT. UG/L AS HG	UNF. TOT. MG/L AS AS	UNF. TOT. MG/L AS AL									
830426	1240		10571	0.0030	0.001 <	0.003 <				0.0020	0.050 <	0.0010										
830525	1125		10589	0.0030	0.0080	0.003 <				0.0020	0.050 <	0.0010										
830726	1300		10625	0.002	0.002	0.009				0.003	0.05 <	0.014										
830823	1345		10643	0.0020	0.0010	0.005				0.0050												
830926	1010		10661	0.0020	0.0010	0.003 <				0.0020	0.050 <	0.0010<										
831025	1530		10679	0.0040	0.0770	0.009				0.0030<	0.050 <	0.0019										
831122	1525		10697	0.0010	0.001 <	0.003 <				0.0030	0.050 <	0.0010<										
831220	1640		10715	0.0020	0.0010	0.003 <				0.0050	0.050 <	0.0015										
840125	1040		50502	0.0020	0.0010	0.003 <				0.0020<		0.001 <										
840222	1035		50520	0.0020	0.0010	0.003 <				0.0020<	0.050 <	0.0010<										
840327	1035		50538	0.0020	0.0010	0.003 <				0.0020<	0.050 <	0.0010<										
840425	1135		50556	0.0030	0.0010	0.003 <				0.0020<	0.050 <	0.0012										
840605	1230		50574	0.0020	0.0010	0.003 <				0.0020<	0.050 <	0.0010<										
840626	1009		50592	0.0020	0.0010<	0.003 <				0.0020<	0.050 <	0.0010										
840731	1250		50610	0.0010	0.0010	0.003 <				0.0020	0.050 <	0.0010<										
840829	1410		50628	0.0019	0.0010<	0.003 <				0.0020<	0.050 <	0.0010<										
840924	1335		50644	0.0022	0.0027	0.0030<				0.0030	0.0500<	0.0010<										
841029	0935		50661	0.0022	0.0012	0.030 <				0.0020<	0.050 <	0.0010										
841126	0940		50676	0.002	0.001 <	0.003 <				0.003	0.05 <	0.002										
841217	0920		50691	0.002	0.002	0.003 <				0.002	0.05 <	0.001										
850129	1000		20601	0.002	0.001 <	0.003 <		0.610		0.002 <	0.05 <	0.002										
850219	1025		20616	0.0020	0.0010<	0.003 <		0.730		0.0020	0.05 <	0.0020										
850325	1000		20631	0.0020	0.0010	0.003 <		1.300		0.0020<	0.050 <	0.0010<										
850429	1240		20646	0.0020	0.0010<	0.003 <		1.300	0.015	0.0020<	0.050 <	0.0020										
850527	1010		20661	0.0080	0.0010	0.003 <		1.100		0.0020<	0.050 <	0.0010<										
850625	1525		20676	0.0020	0.0010<	0.003 <		1.300		0.0020<	0.050 <	0.0010<										
850730	1720		20691	0.0010	0.0010<	0.003 <		1.000		0.0020<	0.030 <	0.0010<										
850826	0930		20706	0.0010	0.0010<	0.003 <		1.400		0.0020<	0.030 <	0.0010										
850930	1350		20727	0.001 <	0.0020	0.003 <		1.400		0.003	0.030 <	0.001										
851028	1040		20748	0.001	0.0010<	0.003 <		0.850		0.002	0.03 <	0.001										
851125	1550		20763	0.001	0.0010<	0.005		1.200		0.004	0.03 <	0.001 <										
851216	0920		20778	0.0010<	0.0010<	0.003 <		0.670		0.0020<	0.030 <	0.0010<										
860128	1245		10401	0.0010	0.0010<	0.003 <				0.0020<	0.030 <	0.0020										
860225	1340		10417	0.002	0.001 <	0.007				0.002 <	0.03 <	0.002										
860401	1330		10433	0.0010	0.0010<	0.003 <				0.0020<	0.030 <	0.0012										
860429	1100		10448	0.0030	0.0010<	0.003 <				0.0020<		0.0013										
860527	1405		10467	0.0020	0.0010<	0.003 <	0.002<			0.0020<	0.030 <	0.0010										
860624	1445		10489	0.0020	0.0030	0.003 <				0.0020<	0.030 <	0.0010<										
860728	1535		10508	0.0040	0.0010<	0.003 <				0.0030	0.030 <	0.0010										
860826	1220		10524	0.0020	0.0030	0.003 <				0.002 <	0.030 <	0.0010<										
860929	1145		10543	0.0030	0.0010<	0.003 <				0.0020<	0.030 <	0.0010<										
861027	1600		10567	0.0010<	0.0010<	0.003 <				0.0020<	0.030 <	0.0010<										

(CONT'D)

Appendix 5. (cont'd)

B.O.W./ SITE: NIPIGON RIVER
SAMPLE POINT: AT HIGHWAY 17, NIPIGON
STATION TYPE: RIVER

STATION ID: 01-0090-002-02

MAJOR BASIN: GREAT LAKES
MINOR BASIN: LAKE SUPERIOR

STORET CODE: 02
001

LAT: 49 01 11.56 LONG: 088 15 02.77

U T M: 16 0408550.0 5430200.0 4

REGION: 06

DISTANCE: 9.656

*INTERIM TEST-NAME:		CUUT COPPER	ZNUT ZINC	PBUT LEAD	NIUT NICKEL	FEUT IRON	MNUT MANGANESE	CRUT CHROMIUM	HGUT MERCURY	ASUT ARSENIC	ALUT ALUMINUM
SAMPLE DATE	HOUR	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. MG/L	UNF.TOT. UG/L	UNF.TOT. MG/L	UNF.TOT. MG/L
YYMMDD	LMT	AS CU	AS ZN	AS PB	AS NI	AS FE	AS MN	AS CR	AS HG	AS AS	AS AL
861125	1250	10588	0.0010<	0.0010	0.003 <			0.0020<	0.030 <	0.0010<	
870126	1300	20501	0.0040	0.0010<	0.0030<			0.0020	0.03 <	0.001	
870224	1155	20516	0.0020	0.0010<	0.0030<			0.0020<	0.03 <	0.001 <	
870330	1425	20531	0.0020	0.0010<	0.0030<			0.0020<	0.03 <	0.001 <	
870427	1330	20546	0.0020	0.0040	0.0030<			0.0060	0.03 <	0.001 <	
870526	1240	20562	0.0010<	0.0010<	0.0030<			0.0020<	0.03 <	0.001 <	
870706	0825	20578	0.0020	0.0010<	0.0030<			0.0020<	0.03 <	0.001 <	
870727	1240	20594	0.0020	0.0010<	0.0030<			0.0020	0.03 <	0.002	
870824	1427	20610	0.0020	0.0010<	0.0060			0.0020<	0.04	0.001 <	
870928	1335	20626	0.0010<	0.0010	0.0030<			0.0020	0.03 <	0.001 <	
871026	1400	20642	0.0010	0.0010<	0.0030<			0.0020<	0.03 <	0.001 <	
MAXIMUM		0.0140	0.0770	0.170	0.008	2.000	0.07	0.030	0.090	0.03	0.22
ARITH MEAN		0.00	0.004	0.012	0.005	0.41	0.02	0.004	0.06	0.00	0.13
GEOM MEAN											0.12
MINIMUM		0.0010	0.001	0.001	0.002	0.05	0.001	0.001	0.04	0.001	0.07
STD DEV (GEOM *)											0.08
# SAMP IN STATISTICS		104	72	35	2	54	16	55	6	53	3
% SAMP (EXCLUDED)		14	40	71	86	5	67	54	94	55	

Appendix 5. (cont'd)

Appendix 6. Water quality data: samples taken on the former walleye spawning beds, Nipigon River. (from Ryder, personal files)

Date	TDS (ppm)	Total Alkalinity (ppm)	Turbidity	Soluble PO ₄ (mg/l)
August 7, 1962	106	82	0.7	
August 3, 1963	106	76	0.7	
August 22, 1964	108	76	1.4	
May 13, 1964	106	76	2.3	0.04 mg/l
August 6, 1964	92	74	1.0	(at mouth)
August 3, 1966	198	75	4.0	
June 2, 1971	80	72	6	

Appendix 7 Field notes concerning the former walleye spawning beds, Nipigon River
(from Ryder personal files).

Names:
T. Marshall
R. Hartley
R.A. Ryder

Date: May 10 1976
11:00pm -1:00 am
Water Temp.: 4 C

Returned to former spawning grounds to determine whether or not they were still being utilized by walleyes. No walleyes were seen despite the fact that during the 1950s as many as several thousand would be seen on a single night once the water temp reached 4 C.

Spawning boulders were covered with a Cladophora-like algae, water was more turbid than I have seen it and water levels were extremely low. Some small perch were seen close to the shore - a species not previously recorded during tagging operations in the 1950s.

The spawning ground conditions were indicative of increased upstream loadings- especially phosphates. The source is undetermined at this time.

Names:
T. Marshall
R. A. R.

Date: May 12, 1978
2:00 am
Water temp.: 5 C

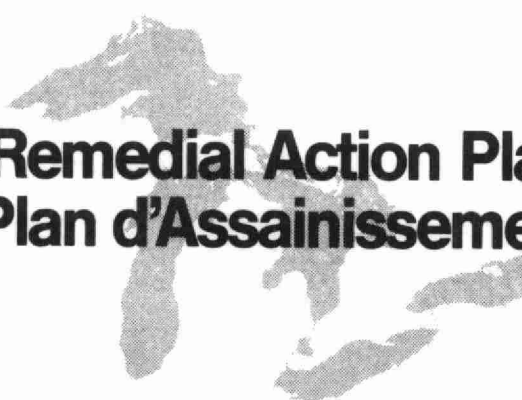
Nipigon River under highway bridge.

No walleye spawning. Water lowest ever recorded. Cladophora thick on rocks and sedimentation on rocks on former walleye spawning ground apparent. A group of 7 perch observed (apparently a spawning aggregation), a few suckers and 1 smelt. One walleye seen at outlet to Nipigon's sewage lagoon. It was very large (and possibly very old).

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Remedial Action Plan Plan d'Assainissement

Canada Ontario 

Canada-Ontario Agreement Respecting Great Lakes Water Quality
L'Accord Canada-Ontario relatif à la qualité de l'eau dans les Grand Lacs